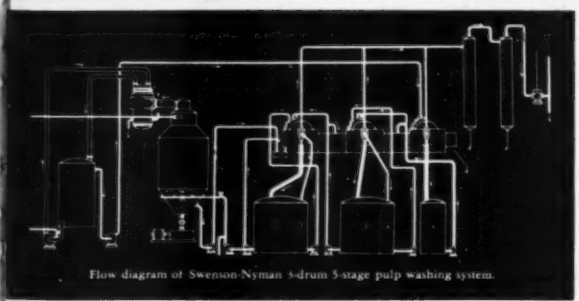
OCTOBER 1950

The Paper Industry

PUBLIC LIBRARY
OCT 24 1950
DETROIT

PULP IS WASHED CLEANER
with
Swenson-Nyman Equipment



Flow diagram of Swenson-Nyman 4-drum 5-stage pulp washing system.

REDUCES DILUTION through multistage operation

CUTS STEAM COSTS by reducing evaporator loads

ELIMINATES SEWER LOSS because it operates as a closed system

REDUCES SALT CAKE LOSS to the small amount (20 to 50 lb per ton) passing through with pulp

Send for Bulletin E-108

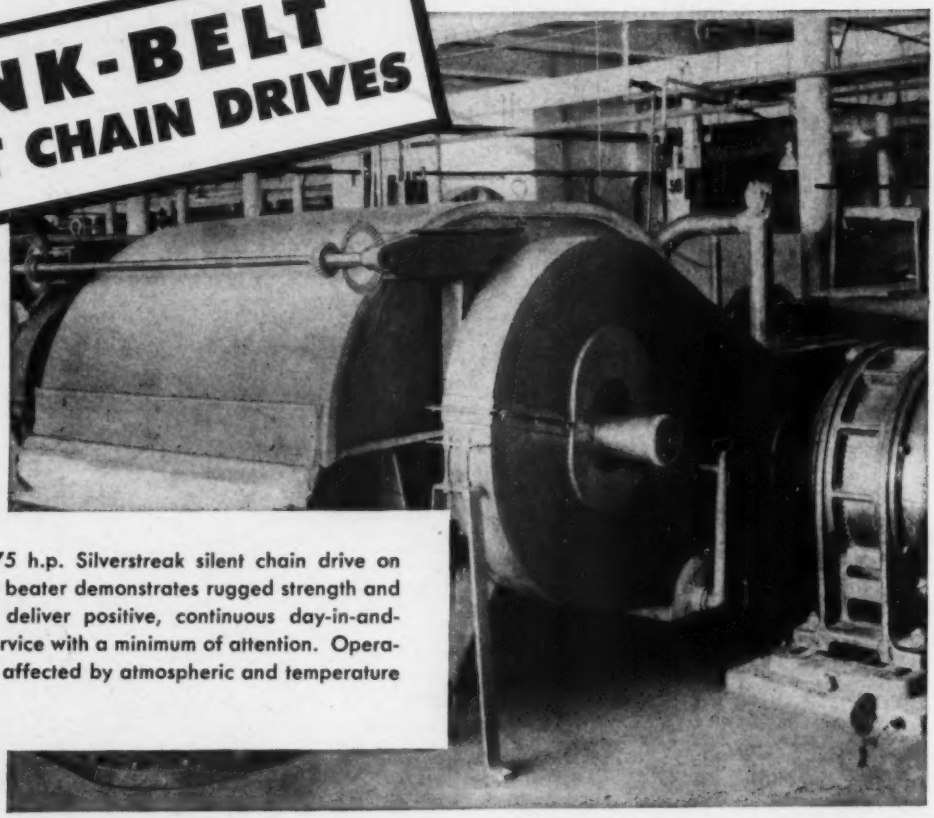
- Evaporators
- Pulp Washers • Deckers • Filters
- Digester Blow Condensers
- Surface Condensers
- Turpentine Condensers • Causticizers

SWENSON
REG. U. S. PAT. OFF.
SWENSON EVAPORATOR COMPANY
DIVISION OF WHITING CORPORATION
15653 Lathrop Ave. Harvey, Illinois
Eastern Sales Office and Export Department:
30 Church St., New York 7, N. Y.
In Canada: Whiting Corporation (Canada) Ltd.
47-49 LaPlante Ave., Toronto 2

✓R v.32 pt.2 Oct. 1950 - Mar. 1951

Built to Take—*or Give*—a Beating

LINK-BELT SILENT CHAIN DRIVES



Link-Belt 75 h.p. Silverstreak silent chain drive on paper mill beater demonstrates rugged strength and ability to deliver positive, continuous day-in-and-day-out service with a minimum of attention. Operation is not affected by atmospheric and temperature changes.

RUGGED

Link-Belt Silverstreak silent chain drives combine ability to carry heavy overloads with the resilience that sustains and absorbs shock.

DEPENDABLE

Silverstreak silent chain drives cost practically nothing for upkeep—run 10, 20, or more years without attention beyond occasional oiling.

COMPACT

Operating efficiently on short centers, they save valuable space. Ratios as high as 10 to 1 are commonly used.

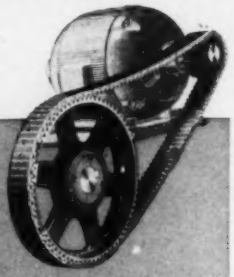
EFFICIENT

98.2% efficiency maintained throughout the life of the drive.

POSITIVE

As the chain, in the form of a flexible rack, meshes with the teeth of the sprocket, the drive cannot slip.

PRE-SELECTED STOCK DRIVES



Chains and sprockets for drives from ½ to 50 h.p. are available from stock at Link-Belt distributors and factory branch stores in all principal cities.

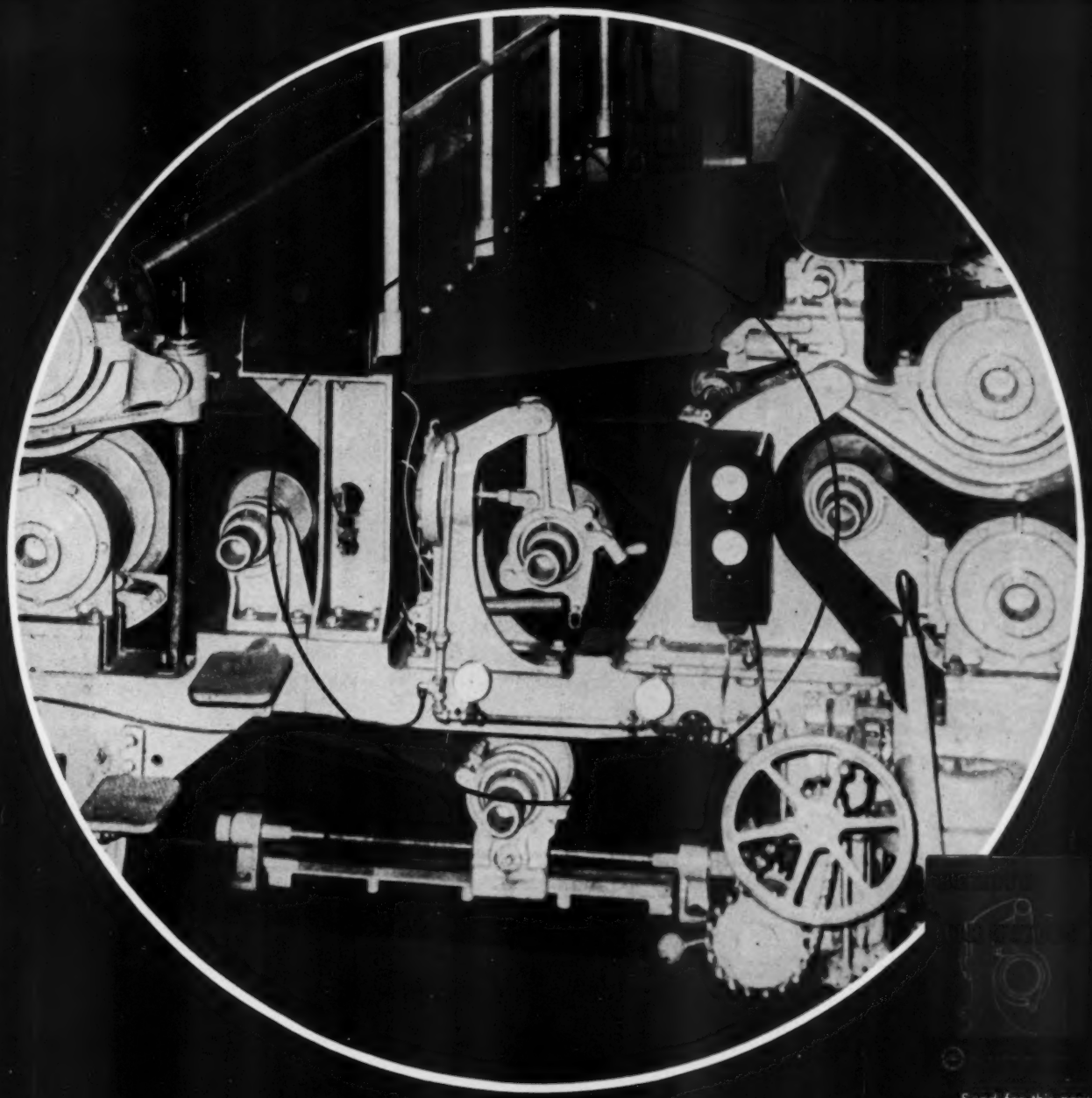
For increased power transmission efficiency, specify Link-Belt Silverstreak silent chain drives.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg.
Offices, Factory Branch Stores and Distributors in Principal Cities 12,048

LINK-BELT Silverstreak SILENT CHAIN DRIVES

Tech.



Send for this new Illustrated Story of Beloit Air Diaphragm Guides

Air Diaphragm Guide . . . smooth, accurate, positive

Smooth, positive operation and ruggedness are among outstanding characteristics of Beloit Air Guides. Designed with simplicity to solve difficult guiding problems in a variety of applications, these Guides are a current development contributing to increased manufacturing efficiency in progressive paper mills. Air Guides are adaptable to any standard felt roll, eliminating odd spares. Special unit can be mounted on existing swing arm guides without replacing arms, guide rolls, or back stands now in use. —*Beloit Iron Works, Beloit, Wisconsin.*

WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!

BELOIT IRON WORKS · PAPER MACHINERY · BELOIT WIS. U.S.A.

BELOIT

PAPER MACHINERY

New type of alloy lining used in Weyerhaeuser Digesters

. . . to overcome intergranular corrosion near welds

THE "new type alloy" to which we are referring is E L C (extra low carbon) solid stainless steel. Both of the digesters illustrated on this page are lined with it. They are part of the equipment the Weyerhaeuser Timber Company recently installed to increase the pulp producing capacity of its Springfield, Oregon, mill from 150 to 220 tons per day.

E L C steel was specified here because its use is the best way known to date of eliminating the poor corrosion-resistant areas often found near the welds in allow steels. The high-carbon alloys formerly used had a tendency to deposit carbides at the grain boundaries in the parent metal adjacent to the weld. Corrosive cooking liquor used in digesters attacks these carbides and causes pitting of the parent metal. The E L C steel does *not* deposit carbides and so overcomes this pitting-type of corrosion.

The two lined digesters that we built for the Weyerhaeuser mill at Springfield are typical examples of the special equipment we build for the paper industry. We also fabricate flat-bottom tanks, elevated water tanks, and many other steel plate structures. Write our nearest office for details.

Each of the digesters shown in the views on this page is 11 ft. in diam. by 30 ft. 1½ in. long and is lined with E L C solid steel.

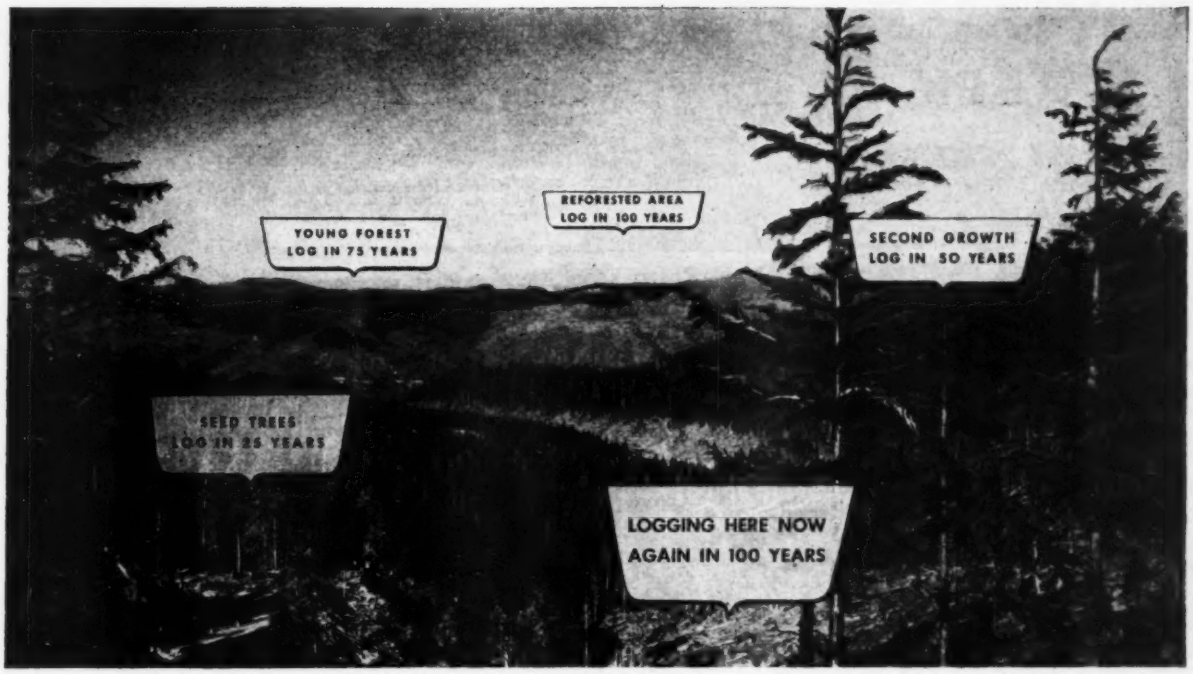
They were recently installed at the Springfield, Oregon, mill of the Weyerhaeuser Timber Company as part of an expansion program.

CHICAGO BRIDGE & IRON COMPANY

Atlanta, 3.....2143 Healey Building
Birmingham, 1.....1511 North 50th Street
Boston, 10.....1026—201 Devonshire Street
Chicago, 4.....2446 McCormick Building
Cleveland, 15.....2267 Guildhall Building
Detroit, 26.....1566 Lafayette Building
Havana.....402 Abreu Building
Houston, 2.....2143 National Standard Building
Los Angeles, 17.....1559 General Petroleum Building
New York, 6.....3350—165 Broadway Building
Philadelphia, 3.....1653—1700 Walnut Street Building
Salt Lake City, 4.....527 West 17th South Street
San Francisco, 4.....1547—200 Bush Street
Seattle, 1.....1327 Henry Building
Tulsa, 3.....1651 Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

GROWING A NEW "CROP" OF TIMBER EVERY 80 YEARS



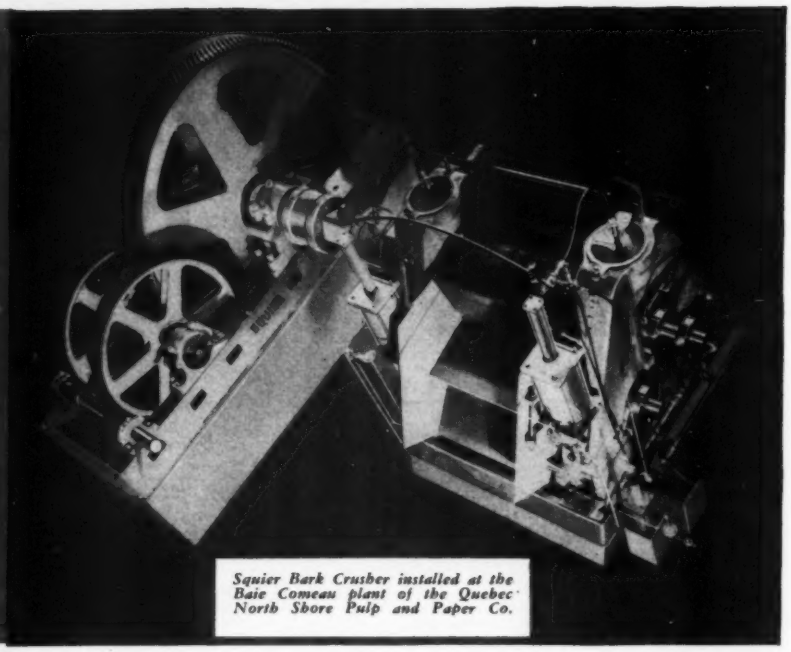
This harvesting and re-growing area at Vail, Washington, reflects the long range planning for successive timber crops

THE WEYERHAEUSER forestry policy is based upon the growing, protecting and harvesting of trees . . . looking toward permanency and improved utilization of the forest crop. The photograph above illustrates this Weyerhaeuser principle of progressive harvesting and regrowing . . . a continuous cycle which will provide perpetual forest crops.

To grow a fir seedling into a tree of mature size requires from eighty to one hundred years. As a young tree progresses through the various stages of growth, it must be protected from fire, disease and insects until it is ready for harvesting.

Weyerhaeuser alone and in cooperation with others in the forest industry, now operates eleven certified Tree Farms. These areas, under modern forest management, will continue to produce new crops of timber as generations come and go. The Weyerhaeuser Timber Company grows trees because it is good business . . . the cycle of harvesting and growing providing a permanent source of raw material for the Pulp Division.

Here's how you PROFIT by using the new SQUIER BARK CRUSHER



Squier Bark Crusher installed at the Baie Comeau plant of the Quebec North Shore Pulp and Paper Co.

THE Squier Bark Crusher is a new machine specially designed to give you highest returns from the barking operations. Not only does the Squier Bark Crusher itself operate dependably and economically, but also the bark is crushed in a way that provides easy, low-cost handling of the milled-bark residue.

Here are some of the outstanding advantages of the new Squier Bark Crusher:

- Milled bark has fibres well splayed out, for quick drying — completely prepared for burning in *one* pass.
- No hogging required, before or after — handles unhogged bark from barking drums.
- Special feeding device (patent applied for) readily handles slippery barks.
- High nip pressures result in low moisture content of finished bark.
- Light, fluffy, splayed-out crushed bark particles easily conveyed by fan.
- Disintegration of bark fibres produces a fuel which will burn readily with any type of furnace feeding.
- Extremely rugged construction, based on many years of fibre-crushing experience.

Write us TODAY for full details

The SQUIER Corporation

(The Geo. L. Squier Mfg. Co.)

213 Mortimer St. **Buffalo, N. Y.**

SQUIER

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 32 • NUMBER 7 • OCTOBER, 1950

Features . . .

Plainwell waste treatment plant now under test 712
National Production Authority set up 713
Second lignin roundtable at The Institute of Paper Chemistry 719
by Louis E. Wise
International Paper Co. makes dissolving pulp at new Natchez mill 724
Types of bearings used on centrifugal pumps 728
by Igor J. Karassik and Roy Carter
Economics + thermodynamics determine optimum kiln size 731
by Ralph Gibbs
Preventive maintenance pays dividends 732
by Peter F. Gaynor, Jr., and C. C. Winston
Calender threader in operation 734
Paper and paperboard making—VIII 735
by Harry Williamson
How safety became a habit at Marinette 739
by George Clossay, Jr.
Great Northern Paper Co. increases hydro-power output 740
Motors vs. turbines for line shaft drives 742
by R. R. Baker
Series of papers on wood chemistry headlines Cellulose Div. of A.C.S. 747
by Louis E. Wise
Fall meeting of Superintendents NW Division 751
Portable chipper in woods operation 768
by C. G. McLaren and Marlow P. Burgy
The problem of curl 768
by August S. Erspamer and William D. Rice
The part played by a superintendent in personnel relations 772
by A. S. Anderson

News . . .

Industry—Allied News 712-722
Association News 747-752
Names in the News 755-760
Necrology 760
International Review 763

Departments . . .

Editorial 707
Current Comment 709
Financial 710
Pictured Highlights 723
Paper Sketches 744
Coming Events 752
Foreign Abstracts 764
Convention Papers . . . Abridged 768-773
New Products 774-780
New Literature 782-786
Current Market Quotations 788-789
Index to Advertisers 790-791

THE PAPER INDUSTRY is indexed regularly in **Engineering Index** and **Industrial Arts Index.** An index to each volume is issued annually by the publisher as a part of the April number.

Copyright 1950 by Fritz Publications, Inc.

Published monthly by:
FRITZ PUBLICATIONS, INC.
Edward B. Fritz (1869-1939), Founder

Publication Staff:

President and General Manager
A. SCOTT DOWD

Vice President and Treasurer
A. C. L. FRITZ

Secretary
A. C. BRUCE

Editorial Director
RICHARD W. PORTER

Editor
BESSE MERRITHEW

Production Manager
EDGAR C. FARREN

Circulation Director
G. E. VON ROSEN

Circulation Field Representative
C. J. ELWELL

Advertising Representatives:

CHICAGO 5: **John D. Henderson,** 59 East Van Buren Street, Wabash 2-3543.

NEW YORK 20: **L. S. van Nydeck,** 9 Rockefeller Plaza, Circle 7-3085.

NEW YORK 17: **Don Seiwell,** Ortgies & Dillon 155 East 44th Street, Murray Hill 7-7048. (New Jersey, Pennsylvania, Maryland and Delaware).

BOSTON 16: **Meade & Company,** 471 Statler Building, Liberty 9677.

CLEVELAND: **L. M. Perkins,** 1199 Dorsh Road, South Euclid 21, Ohio, Evergreen 1-3232.

LOS ANGELES 14: **Nourse Associates,** 412 West Sixth Street, Vandike 5875 (Murray Bothwell).

SEATTLE 4: **Nourse Associates,** Empire Building, Eliot 1769, (Arthur G. Neitz).

THE PAPER INDUSTRY—founded in 1919—known as "The Paper Industry and Paper World" from June, 1939, through December, 1949, assumed its original title with the January, 1950, issue.

Published at 404 North Wesley Avenue, Mount Morris, Illinois.

Address all correspondence to Editorial and Executive Office, 59 East Van Buren Street, Chicago 5, Illinois.

Member: Audit Bureau of Circulation, The Associated Business Publications.

Entered as second class matter December 13, 1948, at the post office at Mount Morris, Illinois, under the Act of March 3, 1879.

Subscription rates: United States, U.S. Possessions, and Canada, $3.00 for one year, $5.00 for two years, $6.00 for three years. All other countries, $8.00 for one year, $18.00 for three years.

COPPER helps this economizer cut paper production costs $1.00 per ton

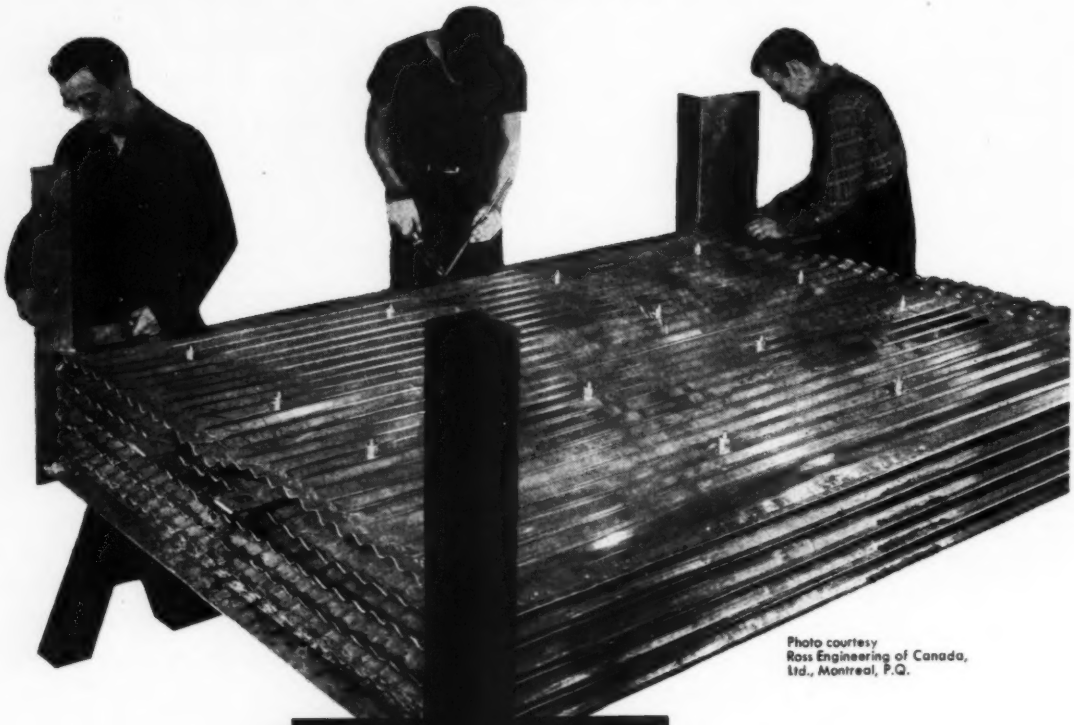


Photo courtesy Ross Engineering of Canada, Ltd., Montreal, P.Q.

THIS Ross-Briner Economizer unit is designed to absorb heat from outgoing air over the drying rolls of a paper machine, and to transfer that heat to the incoming air.

Makers of this equipment say it can reduce production costs $1.00 per ton. As usual, these results are the fruit of good design teamed with the right material.

In this case, the material is ANACONDA Sheet Copper, corrugated. ANACONDA Copper provides the high resistance to corrosion, rapid and efficient heat transfer, correct and uniform temper, and good soldering and brazing qualities which, in this instance, are all essential to good performance and fabricating economy.

Copper and its alloys are among the most versatile of engineering metals. Anaconda's Technical Department is always ready to serve you with counsel on the application of copper to your products. Just write to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

For copper and its alloys . . . consult **ANACONDA®**

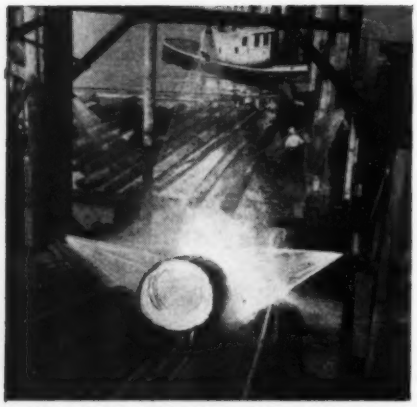
Wringing More Pulp from Every Log—*Saves Wood*

At present day costs of logging and cooking, a 10%, 15% or 20% increase in yield means a lot of dollars saved every day. Further, it means fewer trees need be cut to maintain your mill's present output of paper, thus the uncut trees can grow bigger so that each will produce more pulp.... All this is obtained by High Temperature Alkaline Refining with Sutherlands. Commercial installations on kraft and sulphite pulps prove that yields of 60% and over are possible and this means savings of about $6.00 per ton of pulp, at present day costs of wood, power and chemicals. In addition, high strength with high freeness is obtained, which means increased production on the paper machine due to better drainage, plus improved quality.... As pioneers in the development of pre-refining at the pulp mill, our recommendations can be accepted as sound and practical. One of our sales engineers will be glad to give you further details.

SUTHERLAND REFINER CORPORATION · **TRENTON, NEW JERSEY**
Manufactured in the United States by Valley Iron Works Co., Appleton, Wisconsin
Sutherland Refiner Ltd., Windsor Hotel, Montreal, P. Q.

SUTHERLAND

Life Line FOR ANY MILL



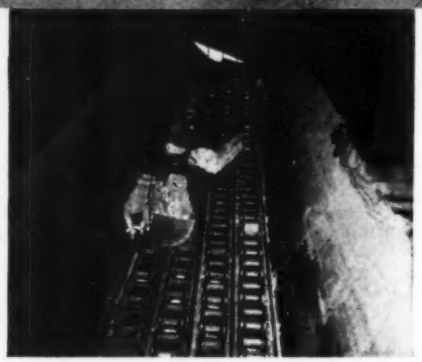
On the log haul, Rex Log Haul and Conveyor Chains keep a steady flow of logs into the mill.

. . . REX PULP MILL CHAINS

The wood handling system is truly the "life line" of the mill. That's why so many mills have standardized on the Rex Line of Standard Pulp Mill Chains. No worries about premature chain failures to break the "life line" . . . hold up production . . . step up costs, with these husky chains on the job. They're built and designed to add life to any wood handling system . . . to keep going under loads and service conditions where ordinary chains would quickly fail.

Whether they're steel or malleable, all Rex Chains are precision-built of the finest materials . . . assembled by the most modern manufacturing methods. Modern assembly line production methods assure product quality and uniformity . . . permit closer inspection and testing.

Right through your mill, you'll benefit by standardizing on the "life line" . . . Rex Pulp Mill Chains. For all the facts, send for your copy of Bulletin 48-27. Call your local Rex Field Office or write Chain Belt Company, 1714 West Bruce Street, Milwaukee 4, Wis.



From splitter to barking drum, Rex Combination Chain, a big favorite in pulp mills, furnishes the moving power.

In a West Coast mill, Rex H-Type Chain carries logs to the debarker. Logs are stored on the chain to eliminate rehandling.

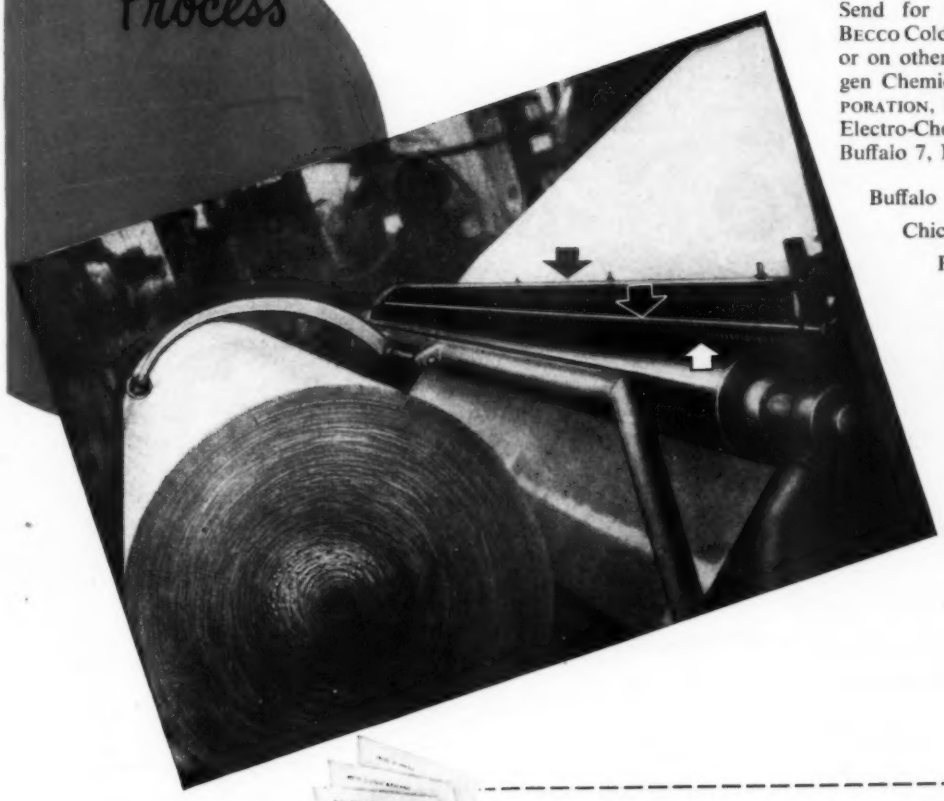
Rex Drop Forged Chain equipped with wooden flights carries hogged fuel for the boilers. Discharge is through the return run of the conveyor. Note the adjustable chutes.

CHAIN BELT COMPANY REX DRIVE AND CONVEYOR CHAINS

FIRST For LASTING Service

Now available from stock

New BECCO Steep Bleaching Process



Proved by BECCO in completely successful field operations!

GROUNDWOODS, SEMI-CHEMICALS, and CHEMICAL PULPS can be bleached by the new BECCO high density process at highest efficiency on the simplest of equipment.

No pulp mixers, no retention equipment, no post-neutralization or reduction are required.

All you need is in the picture! A 2-roll padder transfers Hydrogen Peroxide bleach liquor of controlled alkalinity to one or both sides of a high-density web. Then the rolls (or sheets) are stored for 2 or more days at the mill or in transit and thereafter are ready for paper furnishing.

Send for literature on the new BECCO Cold Steep Bleaching Process or on other uses of BECCO Peroxygen Chemicals. BECCO SALES CORPORATION, Sales Agent for Buffalo Electro-Chemical Company, Inc., Buffalo 7, New York.

Buffalo • Boston • Charlotte
Chicago • New York
Philadelphia

Upper pipe and brush support

Upper bleach liquor distributor pipe

Upper nylon brush for spreading liquor

BECCO SALES CORPORATION, Buffalo 7, N. Y.

Please send me literature on:

(P-2) BECCO COLD STEEP BLEACHING PROCESS
(P-1) Pulp Bleaching with Hydrogen Peroxide
(P-3) Peroxide De-inking
(P-4) Glassine Bleaching
(P-5) BECCO Laboratory Bleaching Methods

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State PI-10-50

The way

the Morden "Stock-Maker" combines beating or refining into one simple and continuous operation.

More than 350 "Stock-Makers" in over 100 mills have proven its superiority for the vast majority of stock treatment requirements.

May we assist you in surveying "Stock-Maker's" advantages for your particular requirements?

MORDEN MACHINES COMPANY

PACIFIC BUILDING • PORTLAND 4, OREGON

in Canada
The William Kennedy & Sons, Ltd., Owen Sound, Ontario

in England
Millspaugh, Limited, Sheffield

Eastern Sales Representative: Union Machine Company, Fitchburg, Massachusetts

Nalco

PITCH CONTROL Produces These Typical Results:

✓ "PAPER MACHINES IN FINE CONDITION"

From a Nalco Engineer's report on The Nalco System of Pitch Control in a mill producing fine papers:

"Beater Room Superintendent reported that paper machines were in very fine condition when examined during shutdown period over the weekend. Trays were reported in very good condition and much better than formerly noted. No sticking on press rolls. Oliver filter reported in good condition, no plugging. The Savalla Saveall reported in very good condition."

✓ NALCO ELIMINATED PITCH AND POPLAR WAX

In a mill manufacturing semi-chemical pulp, another Nalco Engineer reports:

"This company ran into considerable trouble recently from pitch and poplar wax in their semi-chemical corrugated medium. These waxes caused filling of wires and sticking of press rolls which in turn caused up to 30 breaks in a day. Nalco Pitch Control was applied at the fan pump and eliminated their trouble."

THE examples above are typical of the success and versatility of The Nalco System of Pitch Control in paper and pulp mills. Pitch-free operation saves time and money in these mills, and helps to produce a better product.

If you have pitch control problems, write Nalco for full data on the efficient, economical Nalco System as it may apply to your mill.

NATIONAL ALUMINATE CORPORATION
6232 W. 66th Place • Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario, Canada

THE SYSTEM • Serving the Paper Industry through Practical Applied Science

• HIGH VELOCITIES
• LIGHT WEIGHT
• SMALL SPACE

. . . "BUFFALO"
AXIAL FLOW FANS

• HIGH VOLUMES
• PRESSURES TO 15"

. . . "BUFFALO"
"LL" FANS

"Buffalo" GIVES YOU YOUR CHOICE FOR BEST RESULTS ON THE JOB!

"Buffalo" builds both Axial Flow and Centrifugal Fans because ONE type alone can't give EVERY characteristic without sacrificing efficiency. "Buffalo" Axial Flows give you the compact, lightweight design so desirable in those "cramped quarters" jobs. Their efficiencies are very high where static pressures are not much above 1½" and duct connections are straight. "Buffalo" does build axials for high pressures on special installations—where space is the major consideration. WRITE FOR BULLETIN 3533-C for complete facts and comparative performance curves.

Generally, if you want to move large volumes of air, the "Buffalo" Limit-Load Fan is your logical choice. It will give you good efficiencies on systems of fairly high pressure, and even where installed near duct curves. Like the "Buffalo" Axial Flow Fan, it is non-overloading so that motor size may be picked close to capacity rating—and all wheels are dynamically balanced for exceptionally smooth, quiet delivery. Closely graduated sizes give you a range of choice from 600 cfm, to over 500,000 cfm. WRITE FOR BULLETIN 3675.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

213 MORTIMER ST. BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

No More Coupling Failures!

How KOPPERS ENGINEERING Eliminates *Shutdowns for Coupling Replacement* in your plant

Stop coupling failures *before they start*—specify Fast's—the original gear-type coupling. Fast's couplings provide flexibility *without perishable parts,* have been industry's standard for *long-life, low-cost* operation for 30 years!

No matter what type coupling you need, whether it's a floating shaft model, standard or other type, when you buy Fast's Couplings you get the *added advantage* of Koppers Engineering Service. Koppers engineers, backed by *30 years* of Fast's Coupling experience, study your problem, then show you *which* Fast's Coupling you need (and more important) *why you need it!*

Take advantage of Koppers' long-term coupling experience. Specify Fast's and get Koppers Engineering Service —a valuable service you *cannot buy,* but which Koppers offers *without obligation.* The Fast's Catalog contains full details, shows types available and gives complete coupling data. Mail coupon for your free copy today!

These FAST'S COUPLING *Services save you money!*

UNSURPASSED ENGINEERING . . . *Koppers' engineers are acknowledged the best in the industry. Their practical knowledge, backed with 30 years' coupling experience, is at your service!*

IMMEDIATE DELIVERY . . . *All standard types and sizes are available for immediate delivery from "on hand" stocks. In case of emergency, just wire factory for special rush delivery!*

LOWEST COST PER YEAR . . . *Fast's Couplings will outlast equipment they connect if properly maintained. Their cost may be spread out over 25 years or more, offering you lowest coupling cost per year!*

KOPPERS

FAST'S

THE ORIGINAL GEAR-TYPE

Couplings

Mail **FOR FREE CATALOG**

KOPPERS CO., INC., *Fast's Coupling Dept.*, 370 Scott St., Baltimore 3, Maryland.

Please send me a copy of Fast's Catalog.

Name.....

Company.....

Address.....

City.....Zone.....State.....

soda bleach savings with Wyandotte liquid caustic soda

1 Handling costs are reduced because less labor is required in unloading, storing and using *liquid* caustic.

2 Soda bleach foams less in the washers than other bleaching chemicals. Pulp draining and drying are faster, more economical.

3 Soda bleach made with Wyandotte Caustic Soda insures a cleaner finished paper with a minimum reversion of brightness.

These are some of the money-saving advantages Wyandotte Liquid Caustic Soda provides in the bleaching of wood, rag, straw and waste paper pulps.

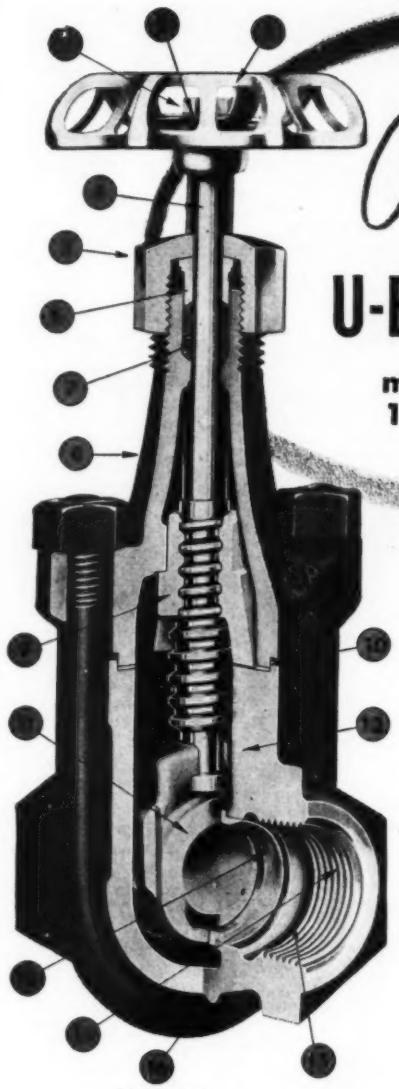
Wyandotte's skilled Technical Service staff will be glad to help you search out economies in bleaching and other operations, as they concern your particular requirements. For information, simply contact your nearest Wyandotte Representative, or write direct to:

Wyandotte Chemicals Corporation

Wyandotte, Mich. • *Offices in Principal Cities*

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

Wyandotte
REG. U. S. PAT. OFF.



Only Jenkins U-BOLT GATES

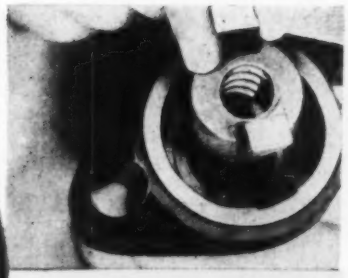
measure up to this 16-point standard

1. Perfect-Grip Handwheel
2. Valve Index Plate
3. Secure Wheel Nut
4. Heavy Manganese Bronze Spindle
5. Large Packing Nut
6. Self-centering Packing Gland
7. Deep Stuffing Box
8. Heavy Duty Bonnet
9. Unique Renewable Bonnet-Saver Bushing
10. Body-Bonnet Safety Joint
11. Extra-Wide Gauge Reversible Bronze Wedge
12. Heavy-Duty Body
13. Bronze Seat Rings, Expanded in
14. Full Length Pipe Threads
15. Liberal Diaphragm Clearance
16. Strong U-Bolt

PRESSURES

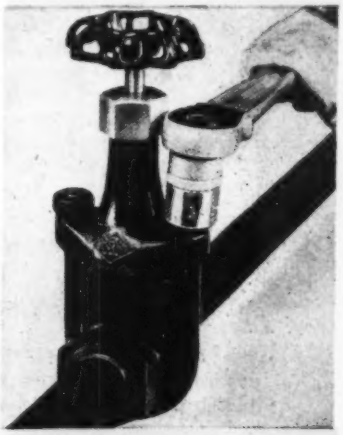
Screwed	Flanged
150 lbs. Steam	125 lbs. Steam
225 lbs. O.W.G.	175 lbs. O.W.G.

Bronze Mounted or All Iron—Sizes ¼" to 3"



BONNET SAVER BUSHING — No need to junk the bonnet when operating threads are worn. Just slip in a new, patented "Bonnet-Saver Bushing" and have good-as-new thread engagement.

EASY TO CLEAN — You can really get into the bonnet of this valve to clean out the chamber above the operating threads.



RUGGED CONSTRUCTION — Here's proof. When the U-bolt nut was tightened down with a 14" socket wrench until the high tensile steel bolt broke, the heavy duty body and bonnet did not crack!

TROUBLE IS RULED OUT! Check these 16 advanced features—for wear-resistance . . . for ease of maintenance. From handwheel to diaphragm, notice how thoroughly trouble has been ruled out in designing this U-bolt valve. No other valve in its class measures up to Jenkins U-bolt Gate on all these points, many of them exclusive.

You can take it apart and put it together again in two minutes, and it's a cinch to clean. When operating threads become worn, just slip in a new "Bonnet Saver Bushing" and restore it to new-valve efficiency. It's a favorite for those plumbing-heating, mine, mill or any services where excessive sediment is tough on valves and where freezing is a hazard.

For "renewability" without waste, bull-necked endurance, and low upkeep cost, you can't beat Jenkins U-bolt Valves. Yet they cost no more! Full details and specifications in new circular, Form 179-B. Jenkins Bros., 100 Park Avenue, New York 17. Jenkins Bros. Ltd., Montreal.

Sold through leading Industrial Distributors

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros

DETROIT PUBLIC LIBRARY

"Marshalling the forces of advertising to help solve national problems and to make democracy work better..."

Do YOU KNOW that the forces of advertising are engaged today in one of the world's greatest jobs of mass education ... *in the public interest?*

Do you know that these forces for good have been released through the vision and unselfish cooperation of American business — advertisers, advertising agencies, media owners and others?

Hundreds of advertising agencies have volunteered their planning and creative time and facilities. Artists, cartoonists, photo-engravers, printers, typographers and others have contributed their services.

Media owners have donated millions of dollars in space and time. National and local advertisers have sponsored and paid for many millions of public service advertising messages.

As a result, the American people are being alerted as never before to the dangers which threaten from within and from without ... the dangers of ignorance about our American economic system, intolerance, tuberculosis, school and teacher shortages, etc.

And, at the hub of this great public service effort is *your* organization ... The Advertising Council.

Advertisers and Media Owners... Your Help is Needed!

Right now The Advertising Council has 14 programs in operation. The success of these programs depends on the public spirited and generous cooperation of advertisers and media owners. *Your* help, in the form of space or time donations, will mean a lot to us. And remember ... *What helps America helps you!*

Yours for the Asking

Write for a copy of Booklet No. 15. It will give you pertinent information about The Advertising Council ... how it started ... what it is ... what it does ...Or ask for material on specific campaigns. Address:—The Advertising Council, 25 West 45th Street, New York 19, N. Y.

Published in the public interest by

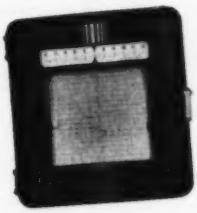
The Paper Industry

*A NON-PROFIT ORGANIZATION FORMED TO UTILIZE ADVERTISING IN THE PUBLIC GOOD

New Answers . . . to Present pH Problems

New Immersion Electrode Assembly uses no sampling line.

New lightweight Flow Electrode Assembly for sampling line measurements.



Two families of controllers for pH applications.

"Controllability Analysis" form for engineering data.

With brand-new developments in pH equipment, plus 26 years experience in pH instrumentation, L&N now has new answers to several important types of industrial pH problems. Furthermore, a unique, time-saving "Controllability Analysis" service quickly and accurately points to the control system which will solve the specific problem.

New developments in equipment cover both the electrodes which sense changes in the pH, and the housings or assemblies which hold the electrodes.

Entirely waterproof construction is featured in the new electrodes. It makes them ideal for humid or wet locations, since they are fully immune to electrical leakage as well as to penetration by process liquids.

One of the new assemblies is an immersion-type unit, to operate in tanks, reactors, etc.; it can even be totally submerged if necessary. It also operates in many places which formerly required a flow-type unit; in such cases it eliminates both the installation and the maintenance of sampling line, pump and accessories. It is made of light, corrosion-resistant plastic.

The other new electrode assembly features convenience and stability where a flow-type unit must be used. Made of plastic, it is light, small, easy to install and thoroughly dependable. Where plastic might not suit, we of course continue to supply assemblies of cast iron and/or Pyrex brand glass.

Two families of recording and controlling instruments are now available; the familiar, accurate and reliable Micromax and the newer but equally dependable Speedomax continuous-balance instrument. Both are available with either electrical or air actuated control systems.

For application engineering simply fill in one of our "Controllability Analysis" forms. Our engineers can then tell how closely pH can be held with either present or proposed plant layout. Let's get together on that pH problem! You will not be obligated; simply write to Leeds & Northrup Co., 4974 Stenton Avenue, Philadelphia 44, Pennsylvania.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl. Ad N-96(6).

HERE IT IS!

Fig. 3639-3678 Self-Priming Centrifugal

Goulds NEW Self-Priming Pump

Only GOULDS gives you all five of these outstanding advantages

1. Absolutely no valves of any kind in pump—nor are any needed in installation. Liquid can drain out of discharge and suction line through pump without affecting priming ability.
2. No recirculation of liquid after completion of priming action.
3. Efficiencies comparable to quality straight centrifugal pumps are thus obtained.
4. Positive fast-acting self-priming similar to priming ability of positive displacement pumps.
5. No large or bulky priming chambers or reservoirs, providing a compact unit at low cost.

APPLICATIONS:

Any service where suction lifts are encountered. Particularly adaptable for automatic service or where liquids to be pumped contain air or gas. Pump will automatically free itself of air and positively will not vapor lock.

Open impeller type. Sump service • Sewage effluent • Marine-bilge pumping, etc. • Mine gathering and dewatering • Dewatering excavations, cellars, etc.

Enclosed impeller type. Cold and hot water • Low pressure fire service • Pumping from underground supply • Irrigation • Sprinkling • Engine jacket cooling water service • Volatile liquids and light oils • Ice core sucking.

SIZES — CAPACITIES AND OTHER FEATURES

39 Models and Sizes

¼ to 5 H.P. ratings

Open and enclosed impellers

Capacities to 120 G.P.M.

Heads to 135 ft. depending on capacities

Suction lifts to 25 ft.

Also available in Flexible coupling motor drive or belt drive and close-cupld gasoline engine - driven unit.

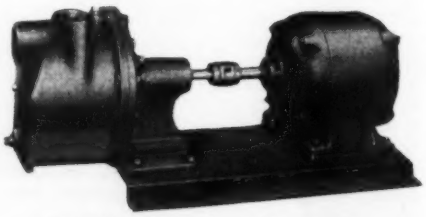


Fig. 3739-3789 Flexible coupling type drive

Patents Pending

FOR FULL DETAILS WRITE FOR BULLETIN 636.1

MEMBER

Goulds PUMPS INC. Seneca Falls New York

For Your Beater . . .
Better

Specify "GENERAL CHEMICAL"

At the critical "beater" stage, you can't be too careful about the chemicals you use. Time and tests have proved to leading paper producers—that for maximum sizing and pH control, it's best to *specify* *General Chemical* Aluminum Sulfate, and other basic chemicals made by America's foremost Alum manufacturer. That way you're *always* sure of highest quality, purity and performance!

ALUMINUM SULFATE

Standard: Lump; Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh; Liquid, 32° Be.
Iron Free: Lump; approx. 2½", Ground thru 8 mesh, Liquid, 32° Be.

SODIUM SULFATE

(Salt Cake) . . . Paper Makers' Grade, thru 8 mesh, 95-99% Na_2SO_4.

Other General Chemical Products For the Paper Industry

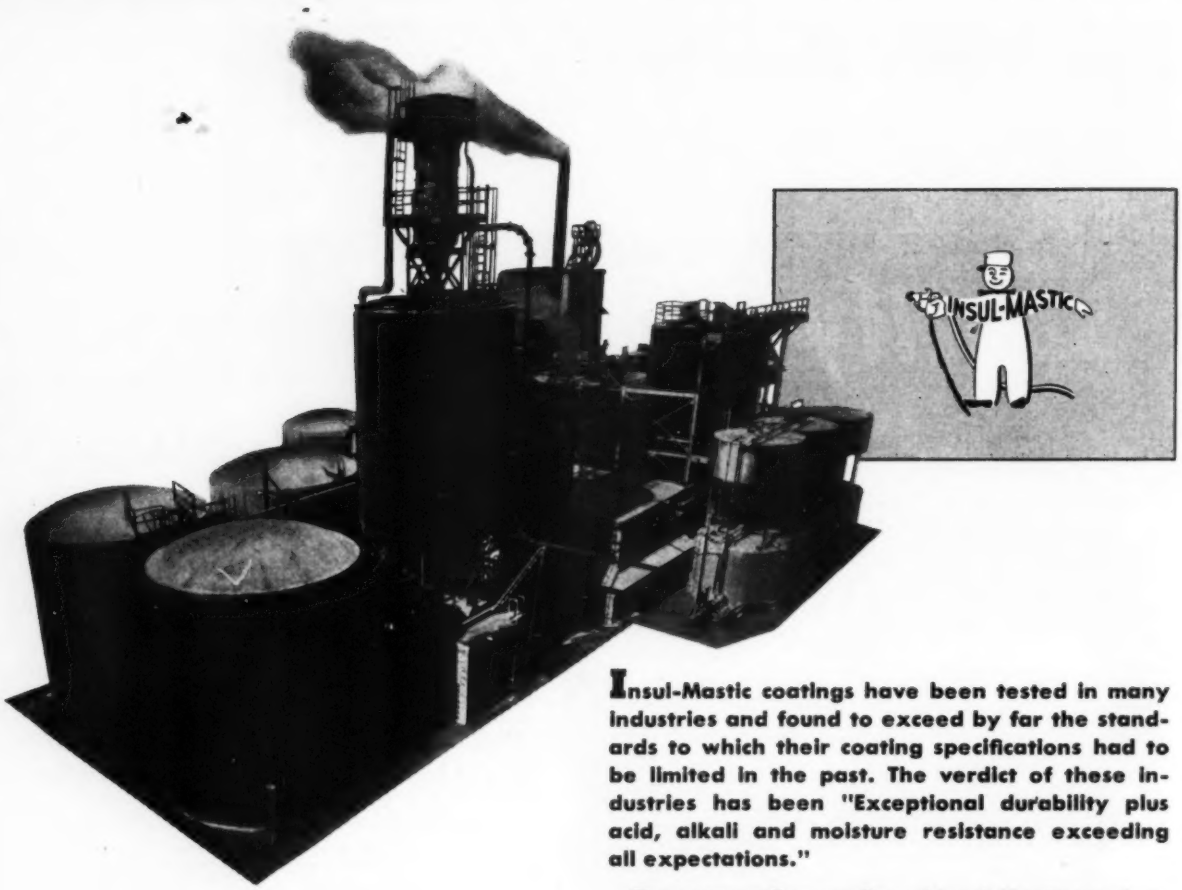
- Aqua Ammonia
- Chromium Potassium Sulfate *(Potash Chrome Alum)*
- Disodium Phosphate *Anhydrous*
- Glauber's Salt *Crystal and Anhydrous*
- Hydrochloric Acid *(Muriatic)*
- Nitric Acid
- Sodium Bisulfite *Anhydrous*
- Sodium Fluoride
- Sodium Thiosulfate *(Hypo)*
- Sodium Metasilicate
- Sodium Silicate
- Sodium Sulfide
- Sulfuric Acid
- Tetrasodium Pyrophosphate *Anhydrous*
- Trisodium Phosphate
- Copper Sulfate
- Sodium Sulfite *Anhydrous*

51 YEARS OF SERVICE

BASIC CHEMICALS
GC
FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh Portland (Ore.) • Providence • San Francisco • Seattle • St. Louis Wenatchee and Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited Montreal • Toronto • Vancouver



BEHIND THIS COATING APPLICATION STANDS THE

DEPENDABLE NAME OF INSUL-MASTIC

Insul-Mastic coatings have been tested in many industries and found to exceed by far the standards to which their coating specifications had to be limited in the past. The verdict of these industries has been "Exceptional durability plus acid, alkali and moisture resistance exceeding all expectations."

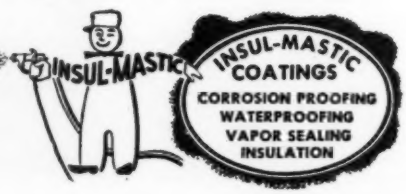
The outstanding quality of Insul-Mastic coatings is due to a completely different type formula. This includes the use of large percentages of such quality ingredients as Gilsonite and mica. Many imitators employ only token amounts of these materials—just enough to mention them.

Insul-Mastic coatings have four basic uses:

- **VAPOR-SEALING—Keeps thermal insulation dry. Prevents corroding of vessel beneath.**
- **PREVENTING CORROSION—Coated steel, submerged in acid solutions has not been harmed.**
- **INSULATION—Cork filled Insul-Mastic will reduce heat flow through metal plates 65%.**
- **WATERPROOFING—Accelerated weather tests have set waterproofing life on building walls at 50 years.**

End your coating problems and reduce maintenance costs. *Think first of the coating that lasts.* Write to Insul-Mastic Department 1 at the address below and see our insert in Sweet's Catalog.

Insul-Mastic Corporation
OF AMERICA
1157 OLIVER BUILDING · PITTSBURGH 22, PA.
Representatives in Principal Cities



One CURLATOR in one year *Saved* 6,500 CORDS OF PULPWOOD IN A NEWSPRINT MILL

Operation Proved

PLUS MORE THAN ENOUGH IN SULPHUR, COAL AND LIMESTONE TO PAY ALL ITS OPERATION AND MAINTENANCE COSTS

Curlators now in commercial operation on newsprint sulphite have paid for themselves in only a few months. The mill referred to increased its yield and maintained its quality standards while making these remarkable savings.

The many thousands of dollars that curlation saved in this mill can also be saved in most newsprint mills.

Name of mill furnished on request

CAN YOUR MILL AFFORD NOT TO MAKE A SIMILAR SAVING?

MAIL THIS COUPON TODAY FOR DETAILS OF CURLATOR *Savings*

CURLATOR* *Corporation*

565 BLOSSOM ROAD · ROCHESTER 10, NEW YORK

*T.M. Reg.— Curlator Corporation, Rochester, N. Y.

CURLATOR CORPORATION
Rochester 10, N. Y.

I would like to be shown how Curlator can make similar savings for me.

NAME_____

ADDRESS_____

CITY_____ STATE_____

cut costs and speed handling

The right kind of chain does it

Many tough conveying jobs in the Pulp and Paper Industry are made easy once Jeffrey Engineers get the call. They can offer a complete material handling service—rugged and dependable units engineered to cut costs and speed production through various processes.

Pulpwood Conveyor shown here—of simple and economical design—is equipped with Jeffrey PW 132 Chain noted for its extra heavy wearing qualities. Here again Jeffrey-equipped means efficient operation. Take advantage of Jeffrey experience and specialized engineering.

Equipment for the Pulp and Paper Mill:

- Belt Conveyors
- Chains
- Chip Conveyors
- Crushers (salt cake)
- Elevators (bucket)
- Feeders (lime—salt cake)
- Log Haul-ups
- Re-chippers
- Screenings Grinders
- Shredders
- Unloaders (barge)

Send for Data

THE JEFFREY MANUFACTURING COMPANY

Established 1877

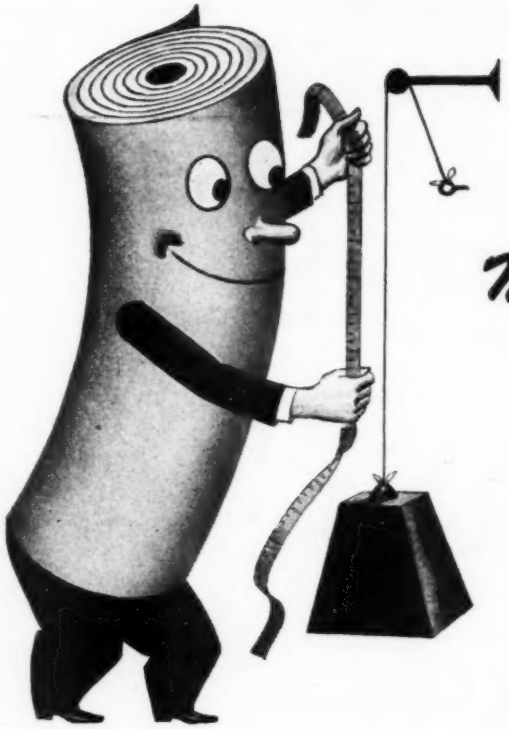
944 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

JM

Baltimore 2	Buffalo 2	Denver 2	Jacksonville 2	Pittsburgh 22
Beckley, W. Va.	Chicago 1	Detroit 13	Milwaukee 2	St. Louis 1
Birmingham 3	Cincinnati 2	Harlan, Ky.	New York 7	Salt Lake City 1
Boston 16	Cleveland 15	Houston 2	Philadelphia 3	Scranton 3

Jeffrey Mfg. Co., Ltd., Head Office & Works: Montreal

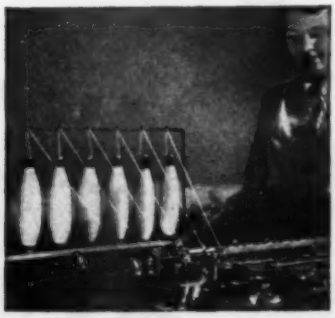


SCIENTIFIC CONSTRUCTION

Makes the Big Difference

In DRYER FELTS

TESTING STRENGTH AND ELONGATION OF YARN WITH MOSCROP TESTER. This unit automatically tests 6 strands of yarn at one time. One of a series of comprehensive laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.

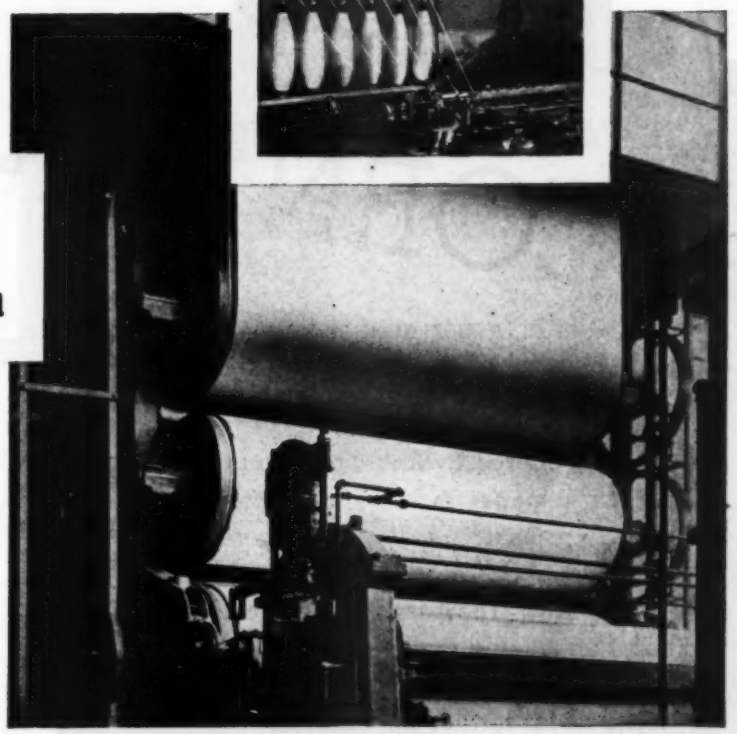


PATENTED

WOODBERRY 887 REINFORCED DRYER FELT

Gives You

Scientific Construction



Asbestos yarns woven at scientifically determined intervals into the face of Woodberry 887 heavy duty dryer felts means longer wear, lower steam consumption, increased porosity, finer paper quality.

AT YOUR SERVICE

Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

Mt. Vernon-Woodberry **Mills**

Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

TURNER HALSEY COMPANY
Selling Agents
40 WORTH ST · NEW YORK

Akron

STARCHES
DEXTRINES
GUMS
CORN SYRUPS

Products offered by Anheuser-Busch to the American paper industry have been produced to meet specific industry requirements. Backed by research and practical "know how", their uniform performance and dependable quality have built an enviable reputation throughout the industry. Write us for further information.

Corn Products Department

ANHEUSER-BUSCH, INC.

SAINT LOUIS

Plant of Scott Paper Company along the Delaware River at Chester, Pa.

ASTEN Dryer Felts

are used on high-speed machines at SCOTT PAPER COMPANY

ScotTissue, Waldorf and ScotTowels have been made on ASTEN Felts for years, and speed is only part of the story. Like the rest of us, Scott Paper Company wants to get things done quickly, but the first consideration is quality.

"ScotTissue," "Waldorf," "ScotTowels" Reg. U.S. Pat. Off.

ASTEN-HILL MFG. CO.
PHILADELPHIA, PENNA.

ASTEN-HILL, LTD.
VALLEYFIELD, QUE.

THAT'S what you get when you install a Norton Pulpstone—a stone tailored to produce just the right kind of pulp to meet your particular requirements.

First the size and end shape are made right to fit the specific grinder for which you have ordered it (diameters range from 40" to 72", widths from 19" to 66"). Then the kind of abrasive and its grit size, the grade (hardness) of the stone and its structures (grain spacing) are selected to produce your kind of pulp from your kind of wood.

Yes, you get minimum pulp costs when you get a Norton "Tailored-to-Order" Pulpstone.

NORTON COMPANY, WORCESTER, MASS.
Norton Company of Canada, Ltd., Hamilton, Ont.

NORTON
PULPSTONES

...THE BROWN TEMPERATURE-HUMIDITY RECORDER

SPECIFY WHEN ORDERING

1. Model Number (see below).
2. Chart No. 1565 for 24-hour revolution, or No. 1571 for 7-day revolution.

MODEL NUMBER	DESCRIPTION	PRICE
612X21K	Two-Pen Model. Temperature and Humidity	$133.00
612X3K	Single-Pen Model. Temperature only	$100.00
612X2L	Single-Pen Model. Relative Humidity only	$100.00

NOTE: Above prices are for 24-hour revolution clock. Where 7-day revolution is desired, specify Chart No. 1571 and add $6.00.

LIGHT, easy to carry, rugged, accurate, inexpensive . . . that's the Brown Temperature-Humidity Recorder . . . just about the handiest instrument you ever used. Hang it on the wall to get a departmental record on either a twenty-four hour or seven-day chart . . . then pick it up and take it with you to check conditions at another location!

Both measuring elements are over-sized for extra sensitivity, and are located outside the case for full contact with room atmosphere. Door may be locked to prevent unauthorized access to records . . . green pen records temperature . . . purple pen records percent of relative humidity . . . 8″ diameter chart has a range of 0–100°F . and 0–100%, and is easy to read.

Mail your order today . . . keep a check on your heating and air conditioning systems. MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4489 Wayne Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

FOR THE PAPER INDUSTRY

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

VANCIDE

32

a non-toxic
germicide

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

The Paper Industry

October 1950

Management and Manpower

GOOD NEWS ON THE KOREAN FRONT naturally has caused a wave of optimism to spread across the country; hopes have been raised that our economy can resume a state of normalcy.

Although we should like to believe that we could return to "business as usual," if we listen to informed opinion, such pleasant thoughts will not be entertained. It seems rather clear that efforts toward mobilization will continue unabated. Already the National Production Authority has been established to administer necessary priorities, allocations, inventory controls and other provisions of the Defense Production Act. Inventory restrictions already have been set up for various pulp and paper raw materials and supplies. In months to come, we may expect these restrictions and controls to become more widespread.

But what of manpower? Most mills already have lost men to the Armed Forces. And, as the defense program gets further under way, the over-all problem of finding enough fighters and workers to meet necessary manpower requirements is going to become more difficult.

On an over-all basis, it's obvious that a good proportion of the men for military will come from the labor force. This means that our industry, as well as others, will have to draw upon new and unskilled personnel. It makes the job of training and teaching new employees of prime importance. It means a bigger job for supervisors and foremen.

Perhaps the most important step top management can take to meet the possibilities of manpower shortage is to strengthen and build its supervisory staff. Supervisors and foremen are, in effect, the front line of management. They are the most important link between the company and the worker. They are the key men responsible for production, and theirs is the job of keeping men and machines operating at highest efficiency. So, if this branch of the management team is to do its job well, it must be of the highest calibre.

It is important, then, that each mill have a group of supervisors who thoroughly understand the operation of their departments. They must understand equipment and they must understand men. They must be capable of handling the problems of training new workers, both men and women, that might have to be hired. There must be enough of them to insure the close supervision so necessary when large numbers of less skilled workers are employed. And they must be capable of assuming their part of management's responsibility because they are a most important part of the management team.

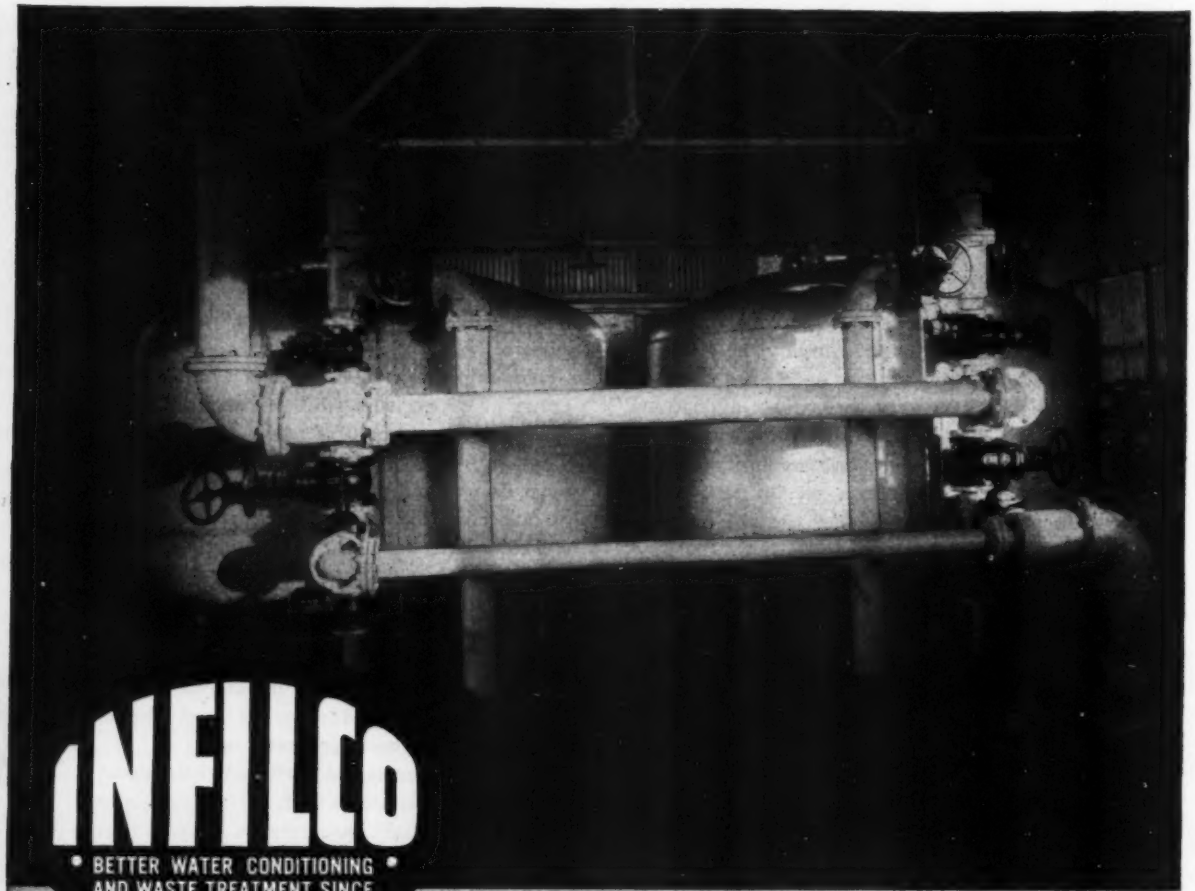
Many companies have learned their lesson and have taken steps to build an adequate staff of top flight supervisors. Those that haven't, ought not delay. Mills that operated most efficiently during the trying years of the last war, were the ones where good supervision was emphasized and where foremen had been carefully selected and well trained. Regardless of whether our country goes farther on the road to mobilization, the mills with good supervisors and foremen will always be on top.

IMPROVE LIQUOR QUALITY
WITH COOKING LIQUOR FILTERS . .

INCREASE CHEMICAL RECOVERY
WITH ACCELERATED CHEMICAL CAUSTICIZING . .

COOKING LIQUOR FILTERS complete the removal of suspended matter in the liquor delivered to the digesters. This permits an increased paper brightness with the use of less bleach and without loss of strength. In addition, digesters show less tendency to scale after the cooking liquors have been filtered.

ACCELERATED CHEMICAL CAUSTICIZING is a process which combines two well-known methods—coagulation and causticizing. Their joint use in a single process results in, 1. A more complete recovery of reusable chemicals, 2. Accelerated settling of solids, 3. Cleaner liquors, and 4. Control over "hard to settle" sludges. Clarifiers are free from internal moving parts. Separate units for each step of the process permit positive yet flexible control. Meters record flows. Proportioners automatically control diluent liquors and discharge valves. Lime feeder and slaker operation is automatic, the amount of lime fed is recorded and controlled in proportion to the flow of liquor. INVESTIGATE the advantages of Cooking Liquor Filters and Accelerated Chemical Causticizing. Our Chicago Office or Field Engineers will be glad to supply you with additional information, without obligation.



INFILCO

• BETTER WATER CONDITIONING AND WASTE TREATMENT SINCE 1894 •

INFILCO INC.

GENERAL OFFICES: 325 WEST 25th PLACE • CHICAGO 16 ILLINOIS

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

Industry Approaches Wartime Basis

**Nation is geared for out-and-out war economy—
Paper Industry one of the first to become
fully organized for war production
by Department of Commerce officials**

THE FIRST MAJOR INDUSTRY asked to assist in necessary allocation of scarce materials was the steel industry. Twenty-one leading executives met with Washington authorities to discuss future procedure.

Before this issue goes to press, however, the paper and paperboard industry will have held a similar conference. Inasmuch as many paper mills already are scanning incoming orders in their wish to give priority to established customers, there is no apparent immediate necessity for anything more than voluntary agreements, legalized by Washington authority.

Priority—price and wage controls

Under executive orders, the machinery has been set up for eventual priority procedure and price and wage controls. William H. Harrison, president of the International Telephone and Telegraph Corp., has been named as administrator of the National Production Authority, with H. B. McCoy, director of the Bureau of Industry and Commerce in the Department of Commerce, as deputy administrator for Industry Operations, under which will fall the paper industry. Under McCoy, will be W. L. Neubrech, Chief of the Pulp and Paper Division of the OIC, which has been moved bodily into the National Production Authority as Administrator of Industrial Operations of the Pulp and Paper Industry.

In the present situation, there are four principal phases to be considered: operations, price control, labor relations and transportation.

P.I. task committees will handle special problems

The field of operations is that in which the paper industry is most immediately concerned. A twenty-seven man committee has been set up, as an expansion of the old Pulp and Paper Industry Council to the Department of Commerce. The preliminary meeting will be for the establishment of procedure, and eventually there probably will be task committees to handle special problems of individual groups. As preliminary to such moves, Murray Howe, former president of Champion-International has been added to Mr. Neubrech's staff to function in the fine paper field. Henry Binzer, secretary of Puget Sound Pulp & Timber Co., has been named as the pulp specialist, and when necessary a coarse paper man will be secured.

The first order issued by the National Production Authority, which will serve as a substitute for the War Production Board of World War II, was for the control of inventories, which are to be kept to a practicable minimum working basis, violation being subject to criminal prosecution. On this initial list appears wood pulp, even though present inventories seem to be below normal. Other items of importance to the paper industry are chlorine, soda ash, copper wire and wire products.

Paper on priority list

One reason for the pressure to establish some form of allocation of paper was probably the difficulty experienced, now at least partially clarified, by the Government Printing Office, the General Services Administration and the Defense Department, in securing bids for paper and paperboard. Conferences between mills and the Government agencies appear to have gone far toward clearing up this dilemma. Paper, however, in the minds at Washington, remains on the critical list, rather than in the lower requirement classifications.

Industry statistics show that paper and paperboard purchasers have loaded the mills with orders, with the result that despite record output, the backlog of orders exceeds any former tonnage.

Watch prices—especially pulp and newsprint

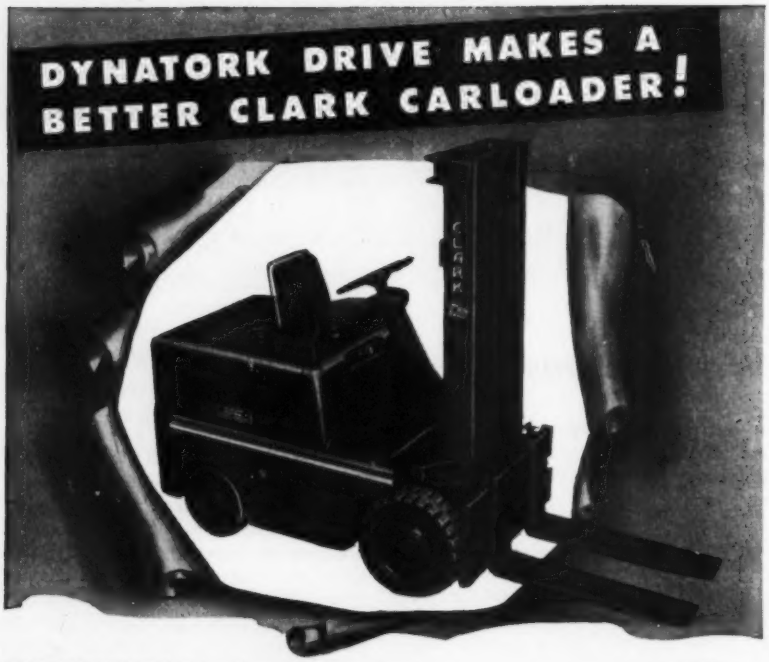
The price situation has not progressed as far as the operations part of the picture. Under the Defense Production Act of 1950, there are provisions for price and wage control, which are tied together by Congressional Action. The Economic Stabilization Agency has been established, but naming of personnel has not proceded as far as has been seen in Industry Operations. The President is loath to impose price controls at this time, presumably because such a step would also call for wage stabilization. The base for price stabilization action is May 24 to June 24, and action may be taken involving any unreasonable increase since that period. There are already reports of a possible increase in newsprint prices, and last quarter pulp prices are likely to be generally higher.

Political snags on the labor front

The labor picture is complicated by political considerations. The President has called for the resignation of Robert N. Denham as General Counsel of the National Labor Relations Board, as a definite move to secure the political support of labor. Labor organizations have resented the manner in which Mr. Denham conducted his office, which he deemed to be responsible for proper labor relations with management, and not partisan to labor. There are hints that labor is hurrying to secure new contracts so that any future rollbacks of prices, to include wage stabilization, will give labor a higher base on which computations may be made. There is no question that recent new agreements with labor have resulted in higher prices for commodities, notably automobiles and electric equipment.

One of the early administration steps was the naming of Interstate Commerce Commissioner James K. Knudson as Director of Priorities and allocations for all domestic transportation. The first steps are expected to be moves to alleviate the freight car shortage. In taking his new position, Mr. Knudson said he had no predilections for Government

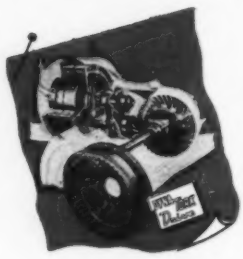
DYNATORK DRIVE MAKES A BETTER CLARK CARLOADER!



FASTER! *from forward to reverse* IT DOES MORE WORK!

EASIER! *to operate than your car* IT DOES MORE WORK!

BETTER! *neutral tests prove* IT DOES MORE WORK!



This combination of CARLOADER* and DYNATORK* DRIVE constitutes a forward step of enormous significance to the science of Materials Handling. You'll want to know all about it. A Clark bulletin will bring you the facts in convenient form. Write for it . . . or simply fill in the coupon and mail it.

*Trade Mark Reg. U. S. Pat. Off.

HERE'S A COMBINATION DESTINED TO MAKE MATERIALS HANDLING HISTORY—

• The husky and versatile gas-powered Carloader fork-lift truck of 3,000-, 4,000- and 5,000-lbs.-capacities, has done more than any other one model to establish Mechanized Materials Handling as essential to modern high-speed, low-cost production.

• The revolutionary Dynatork Drive cuts deeply into handling costs *by increasing as much as 20 per cent the amount of work a fork truck can do.* It transmits engine power to the drive wheels by magnetic induction, through an air gap—no clutch, no conventional transmission. It's unique because it does not have to be brought to a stop before reversing.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 22, MICH.

Please send: ☐ Literature on Carloader with Dynatork Drive ☐ Movie Digest ☐ Material Handling News

Name_____

Firm Name_____

Street_____

City_____ Zone____ State_____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

control and would keep the whole program on a voluntary and limited basis.

November election smoke

Throughout the whole Washington picture the spectre of politics and the November elections is seen in the background. Both parties are sparring for political advantage at a time when there should be national unity. The Republicans are pressing for immediate all-out controls, but price controls and wage stabilization can hardly be effected before the November congressional elections, if then. There is practical unanimity on both sides on the need for increased taxes to meet the Korean and world emergency, but the working out of all the details can hardly be effected before early in 1951.

Forest Service may push Alaskan project

A feeling prevails at Washington that the Forest Service will take advantage of the industry mobilization program of the Administration to further its long delayed efforts to establish a newsprint industry in the Alaska National Forest areas. This has been a favorite program of the Forest Service for some twenty or more years, but risk capital has hesitated to invest in projects which offer opportunities, questionable to many investors, for profit.

Various projects have been launched, principally in the pulp producing field, but for one cause or another have failed of fruition to date. At a time when the Government is considering financing new productive enterprises, it would be quite in the line of Forest Service thinking to seek the financing by the Government of newsprint enterprises in this Far West region.

Financial

▶▶▶ With securities strong in the face of the international military situation, paper mill stocks followed the trend, and were generally higher in the past month than after the Korean crisis broke.

Back of the increased dividends announced by various paper companies and the increased earnings, is the basic story of a lowered average overhead cost. It has been estimated that over all a paper mill must run at from 75 to 80 per cent of capacity to carry overhead charges. When production rises to 100 per cent of capacity, based on six twenty-four hour days a week, the basic overhead is spread over a larger tonnage. Increased profits, therefore, are not due to higher prices, which have not been such as to be reflected in reports of earnings, but to the ratio of overhead, always heavy in the paper industry and which in times of slack business has kept earnings to nearly or in some years even below zero.

Celotex Corp.—Net income for nine months ended July 31 was $1,388,486 as

compared with $887,921 for the comparable period a year ago.

Crown Zellerbach Corp.—Net income for three months ended July 31 was $6,081,714 as compared with $4,039,600 for the same quarter of 1949.

Great Northern Paper Co.—Net income for the half year ending June 30 was $1,732,335 as compared with $2,851,845 a year ago.

Kimberly-Clark Corp.—Net income for three months ended July 31 was $3,023,479 as compared with $1,587,590 for the same quarter of 1949.

Marathon Corp.—Net income for nine months ended July 31 was $4,476,592 as compared with $3,390,857 a year ago.

National Container Corp.—Net profit for the first half of 1950 was $2,742,032 as compared with $2,715,459 for the same period a year ago.

Paraffine Cos., Inc.—Net income for twelve months ended June 30 was $1,423,721 as compared with $3,244,613 for the previous fiscal year.

Sound View Pulp Co.—Net income for eight months ended August 31 was $3,129,454 as compared with $3,504,464 for the comparable period a year ago.

United Board & Carton Corp.—Net income for the year ended May 31 was $169,767 as compared with a deficit in the previous fiscal year of $322,330.

United Wallpaper, Inc. — Deficit for twelve months ended June 12 was $592,689 as compared with a net income of $793,131 a year ago.

West Virginia Pulp & Paper Co.—Net income for nine months ended July 31 was $8,100,515 as against $6,522,713 for the comparable period a year ago.

New York Stock Exchange—Stocks

	Closing Prices Sept. 20	Aug. 21
A.P.W. Products	4⅜	* 4⅛-4⅞
Celotex	15⅞	15⅜
Same Preferred	16⅜	16⅛
Certain-teed Products	15¼	14⅛
Champion P. & F. Co.	42¼	41
Same Preferred	104¾	*104-105½
Chesapeake Corp.	38	34⅜
Continental Diamond	9⅜	9⅛
Container Corp.	57⅜	49⅝
Same Preferred	*103-104	*102-103
Crown Zellerbach	40¾	37⅜
Same Preferred	104½	102⅝
Same $4 Preferred	*118-120	111-116
Dixie Vortex	43¾	43½
Same "A"	* 52½-54	51
Eastern Corp.	15⅜	15⅝
Robert Gair	9¼	8⅞
Same Preferred	18⅜	* 17¼-17¾
Gaylord Container	20⅜	20
International Paper	57½	57¼
Same Preferred	*107-108½	*108-109
Kimberly-Clark	41⅛	38
Same Preferred	168	153
McAndrews & Forbes	* 38¼-39⅜	38
Marathon	33⅝	33
Masonite	56½	53½
Mead Corp.	26¾	25⅛
Same Preferred	92	* 91-93½
Same 2nd Preferred	53	50½
National Container	9⅜	9⅛
Paraffine Cos.	15¾	15¼
Same Preferred	* 98½-99	*98¼-99½
Rayonier, Inc.	41	39½
Same Preferred	34⅛	34⅜
Scott Paper	43	44¼
Same $3.40 Preferred	*101¼-102	* 99⅝-100
Same $4.00 Preferred	*109-111	107½
St. Regis	10	10
Same Preferred	* 95-96½	* 94-94½
Sutherland Paper	44	* 44-45
Same Preferred	*112-113	*113¾-114½
Union Bag & Paper Co.	35	33⅝
United Board & Carton	13⅝	12
United Wall Paper	2⅝	2
Same Preferred	25⅝-24½	24½
U.S. Gypsum	111	106
Same Preferred	*182¾-185	*184-187
West Va. P. & P. Co.	64¾	60⅝
Same Preferred	*108⅝-109¼	*108-109
A.P.W. Products 3%	83	83
Celotex 3½%	102¾	102
Champion P. & F. Co. 3%	103	103
Mead Corp. 3%	107	106¼

New York Curb Exchange—Stocks

Am. Writing	8	* 7¼-7⅝
Great Northern	43⅜	44

*Closing Bid and Asked Prices.

AMONG AIR CLUTCHES

ONLY FAWICK

PROVIDES ALL THESE FEATURES

360° RADIAL CONTACT—Application of the operating pressure at the maximum diameter results in the greatest operating torque.

AXIAL CONTACT—Fawick design provides uniform-pressure, constant-velocity contact between the full width of the friction shoes and the drum.

SHOCK ABSORPTION—Operating torque is transmitted through the flexible rubber tube, dampening shaft vibrations and cushioning peak load shocks.

CONTROLLED TORQUE—Variation of operating pressure makes sensitive control of applied torque possible. Peak overload protection is assured at a selected air pressure.

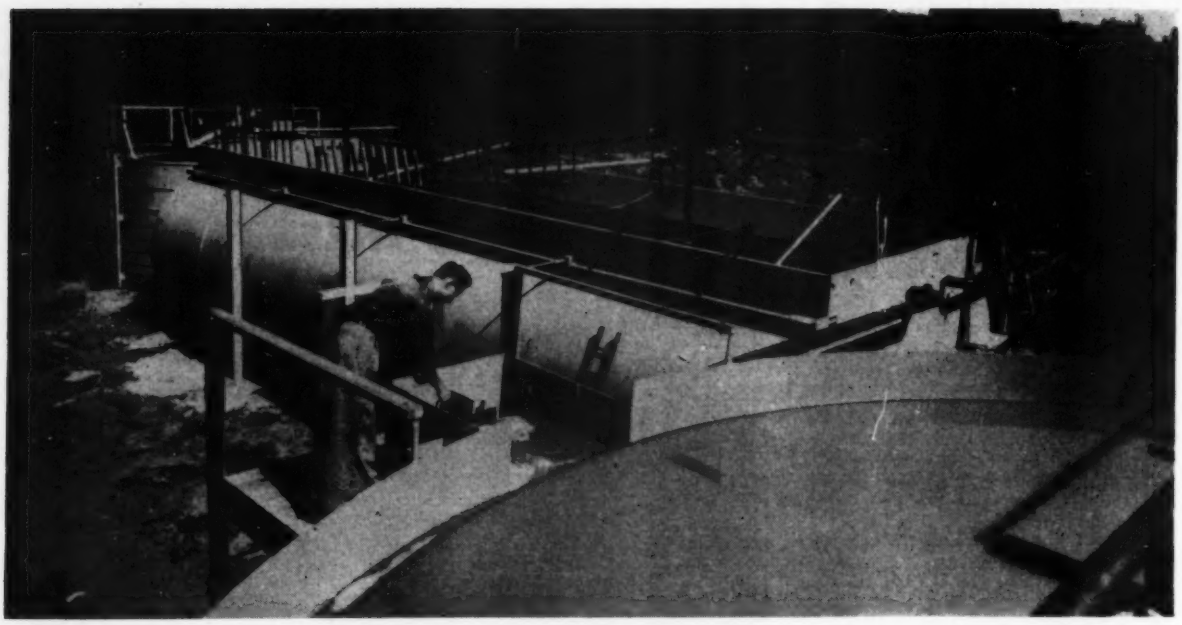
For specific information on all advantages of Fawick Industrial Clutch and Brake Units, write to the Main Office, Cleveland, Ohio, for Bulletin 300.

All desirable clutch characteristics are built into Fawick Airflex units

FAWICK Airflex CO., INC.

FAWICK CLUTCHES = + + + = PEAK EFFICIENCY

AXIAL CONTACT 360° RADIAL CONTACT SHOCK ABSORPTION CONTROLLED TORQUE



DEINKING waste water treatment plant at Michigan Paper Co. . . . Overflow from primary settling tank to aeration tank (center) checked by M. J. Bachelder, operating chemist

Plainwell waste treatment plant now under test

Kalamazoo River stream pollution may be solved. First commercial waste water treatment plant draws wide interest among paper manufacturers . . . Plan established by national and state groups . . . Plant owned by six paper mill companies of the Valley.

▸▸▸ DATA ON OPERATION details of the first commercial installation of a plant designed to solve the paper industry's stream pollution problem are now being gathered.

The installation went into operation about the first of September on the shores of the Kalamazoo River at the plant of the Michigan Paper Co., Plainwell, Mich. At present, the plant is processing about one million gallons a day, deinking waste water from the Michigan Paper Co. This plant was built and is owned by the Kalamazoo River Improvement Co., formed in 1946 by six mills in the Kalamazoo River valley, all of which were faced by a deinking waste water stream pollution problem.

A pilot plant based on a method of treatment worked out by Philip P. Morgan was built by the mills; when operation of that plant warranted, a full-size commercial installation was erected. That plant is the one now in operation at Plainwell. The mills behind this project are: Kalamazoo Paper Co., Rex Paper Co., Allied Paper Mills, St. Regis Paper Co., Michigan Paper Co., and Watervliet Paper Co. (Cf. P. I. and P. W., May, 1948; P. I., May, 1950)

If the present operation proves successful, it is planned to sell that plant to the Michigan Paper Co. Then each of the other five mills with a deinking waste problem will build and put into operation its own waste water treatment plant.

This development promises to solve the long controversy over pollution of the Kalamazoo River. Under pressure from the stream control commission, now known as the Michigan Water Resources Commission, practically all cities along the River have completed plans for construction of sewage disposal plants. Also, the state legislature has authorized the state to pay its share of the cost of handling sewage and waste water from its institutions. A great deal depends on the operational data obtained from the waste water treatment plant at Plainwell.

The fight against pollution of the Kalamazoo River is almost as old as the Valley's paper industry. By 1943 the situation had become a matter of such controversy that the National Council for Stream Improvement for the Pulp and Paper Industry was established.

Meanwhile, the Kalamazoo Valley's paper mill executives had been at work on the problem and the then Michigan Stream Control Commission had been organized.

River pollution, it was recognized, is not wholly due to waste water from mills making pulp from waste printed matter. But the other types of pollution—domestic, industrial other than paper mill and "white water" from mills making paper and paperboard—have their solution.

Only the deinking waste water with its oxygen-depleting content still defied treatment.

So, in 1945 Philip F. Morgan became resident engineer for the National Council, set up his laboratory at Kalamazoo College, and began intensive research on the problem.

The results of Mr. Morgan's pioneering work in this field can now be seen at Plainwell. Knowing that chemical treatment of deinking waste removed only part of the oxygen-consuming material, Mr. Morgan sought other means of rendering it harmless.

He finally discovered that by putting the waste water through what is practically a septic tank treatment, the water discharged into the river was no longer polluted.

As Mr. Morgan's research approached the pilot plant stage, the Kalamazoo River Improvement Co. was formed with Dwight Stocker, president of Michigan Paper Co., as its president.

Mr. Morgan, in co-operation with the Kalamazoo River Improvement Co., supervised construction of the 60,000 gallon per day pilot plant and established that on such a scale the process he had devised was a success. In September, 1948, three years after he began the work, Mr. Morgan left the Council to accept an assistant professorship at the University of Iowa at Iowa City.

Mr. Morgan's place was taken by A. J. Paladino, who developed the design of the commercial installation and supervised its construction. M. J. Bachelder, a 1950 chemistry graduate of Kalamazoo College, is in charge of the plant's operation.

"The pilot plant was built close to the mill," Mr. Stocker said. "This installation is on the border between the company's property and that of the city of Plainwell.

"It is our hope that, should this treatment installation prove as efficient as we expect, the city will build its sewage treatment plant adjoining. Then perhaps the same crew can operate both installations."

The former stream control commission has been insistent in its efforts to clear up pollution problems in Michigan. In that work the chairman, Albert E. Huestes, commissioner of health, and the executive secretary, Milton P. Adams, together with Loring F. Oeming, chief engineer, have taken the lead. They have also worked closely with the Kalamazoo River Improvement Co.

"We take the waste water from the mill's deinking department, about a million gallons a day," said Mr. Bachelder, "into the primary settling tank. In this 5,500 cubic foot tank the primary sludge is settled out and then pumped to the settling lagoons.

"As waste water from the mill is pumped into the primary tank, water free of primary sludge overflows into the aeration tank. There a non-pathogenic type of bacteria, now greatly different from that in the ordinary septic tank, attack the solid material in suspension in the waste water.

"An aeration system in the 11,000 cubic foot aeration tanks feeds oxygen to the bacteria attacking the solid matter. As this bacterial digestion takes place, the waste solids are rendered harmless so far as their oxygen-robbing propensities are concerned.

"The water then, after a secondary settling to take out solids left by the bacterial digestion and other solids that passed the first settling tank, is pumped into the river.

"It isn't potable, of course. But it is of a nature that has no effect on the river water's ability to support aquatic life."

However well the waste water problem has been solved—and that is still a matter for Mr. Bachelder's operation data to determine—the primary sludge is still a puzzle.

"We don't know the exact nature of these solids," said Mr. Stocker. "Until we do, the question of how to dispose of them will bother us.

"There isn't a great deal of sense in solving the problem of waste in water only to create a problem of waste on land."

When the sludge in the lagoons settles and dries, it packs into a hard, fibrous cake somewhat the consistency of wallboard filler.

"While it isn't fireproof," said Mr. Stocker, "we're hoping it might be used for some type of construction work. If we can find someone who will process it, we'll be glad to let them have it for the hauling."

"Knowledge of the operation gained from the pilot plant," said Mr. Bachelder, "makes it practically certain that the process is going to be a success. However, accurate operational data gathered in September and October will give us a basis for real evaluation of the process in its application to other plants."

As evidence of the keen interest in this pioneer installation by men who have fought the pollution problem for years, the Michigan Water Resources Commission has scheduled its December meeting at Kalamazoo. The deinking waste water treatment plant will be the center of attention during that gathering.

National Production Authority Set Up

Priorities . . . Allocation . . . Inventory Controls

Under the Defense Production Act signed by the President on September 8, the Department of Commerce was given authority to establish an agency known as the National Production Authority. This new body, which is something like the War Production Board, will handle priority, allocation, and inventory controls provided for under the Defense Act.

The following divisions of the Department of Commerce's Office of Industry and Commerce will now come under the NPA: Iron and steel, metals and minerals, rubber, textiles and leather, chemicals, forest products, construction, machinery and equipment, general products, motion pictures, foods, petroleum, and fuels and energy.

Personnel appointments effective under this new agency are:

William H. Harrison, president of International Telephone and Telegraph Corp., is administrator of the new authority.

H. B. McCoy, director of the Bureau of Industry and Commerce, has been named assistant administrator for industry operations under Mr. Harrison.

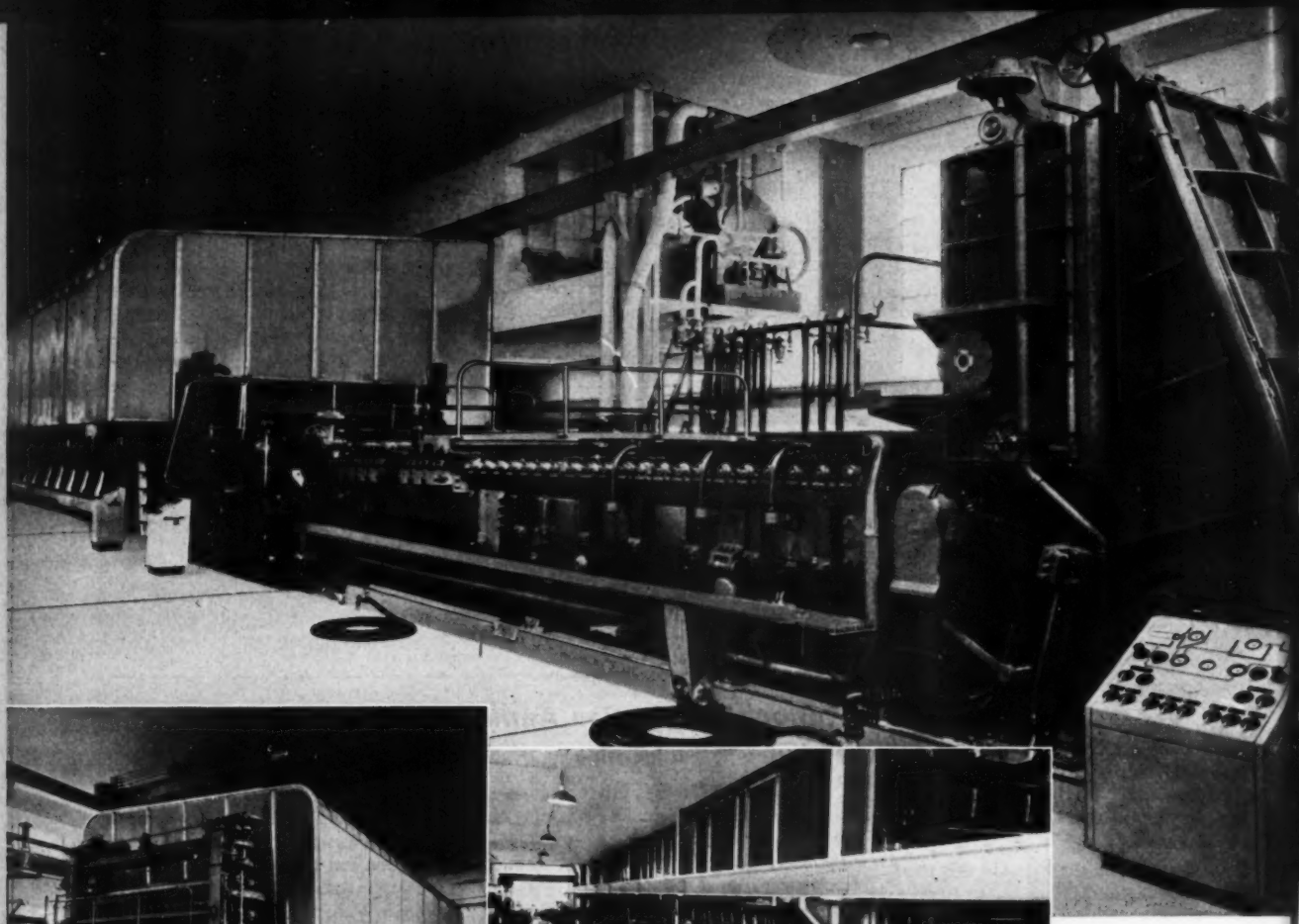
W. L. Neubrech, chief of the Pulp and Paper Division under the Office of Industry and Commerce, has been named administrator of industrial operations of the pulp and paper industry.

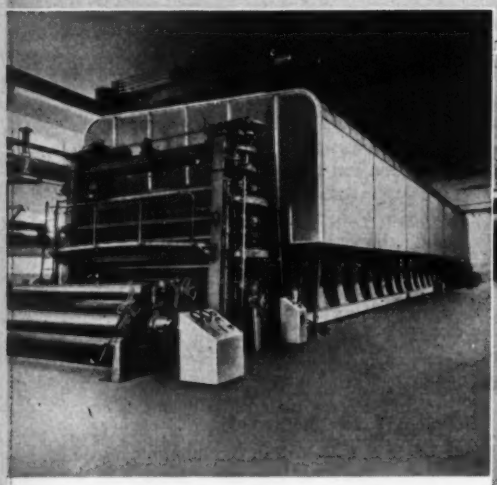
Thirty-two commodities, considered in short supply, were covered by NPA inventory control order NPA Reg. No. 1 on September 15: *Building materials*—cement, gypsum board, sheathing and lath; *chemicals*—industrial alcohol, benzine; caustic soda, chlorine, glycerine, and soda ash; *forest products*—softwood and hardwood lumber, softwood, plywood and pulp; *iron and steel*—pig iron, gray iron castings, practically all types of carbon and alloy steel, rough forgings, and iron and steel scrap; *metals and minerals*—aluminum, columbium, cobalt, copper, magnesium, manganese, nickel, tin, tungsten, zinc, and non-ferrous scrap; *rubber*—natural rubber (both dry and latex) and all synthetic rubbers; *textiles*—burlap, cotton pulp, high-tenacity rayon yarn, nylon staple and nylon filament yarn.

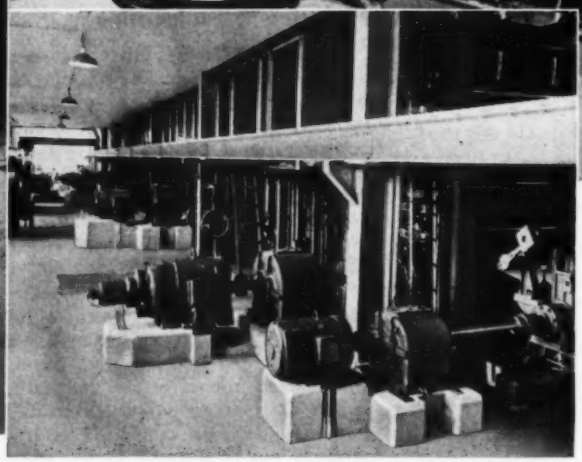
The NPA stipulated that businessmen cannot buy, receive, order or deliver more than a "practicable minimum working inventory" of the above items. Defining a "practicable minimum" inventory, the NPA stated that it was "the smallest quantity of material from which a person can reasonably meet his deliveries or supply his services on the basis of his currently scheduled method and rate of production.

27-Man Advisory Committee

The following paper industry executives have been invited by the Secretary of Commerce to serve as an Advisory Committee to the Department, representing the pulp, paper and paperboard industries: D. K. Brown, Neenah Paper Co.; Hugh J. Chisholm, Oxford Paper Co.; Leo E. Croy, Marathon Corp.; B. G. Dahlberg, formerly president of Celotex Corp.; George E. Dyke, Robert Gair Co.; R. K. Ferguson, St. Regis Paper Co.; Sydney Ferguson, The Mead Corp.; Sydney Frohman, Hinde & Dauch Paper Co.; H. H. Hanson, W. C. Hamilton & Sons; I. J. Harvey, Jr., Flintkote Co.; J. H. Hinman, International Paper Co.; Eugene Holland, Masonite Corp.; Amor Hollingsworth, Penobscot Chemical Fibre Co.; L. K. Larson, Pulp Div., Weyerhaeuser Timber Co.; M. C. McDonald, Chesapeake Corp. of







FEATURES OF THE 138" PUSEYJONES MACHINE AT PAPIERFABRIK UTZENSTORF

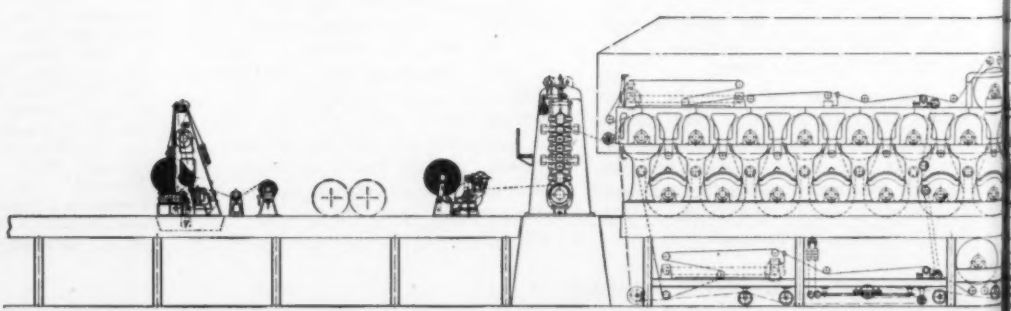
Improved type Flow Spreader combined with 6 ft. high adjustable slice. Special stock level control.

Fourdrinier Part suitable for wire 75 ft. long and 138" wide, seven 7" wide monel suction boxes with oscillating device, 30" suction couch roll with lump breaker roll and pneumatic draw roll; "Rapi-drape" wire changing device and adjustable wire pitch arrangement.

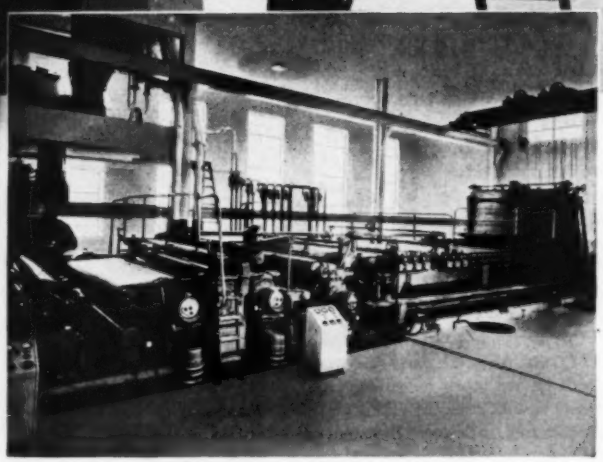
Press Part of dual press arrangement with two 26" rubber covered suction rolls and 32" Stonite covered center roll, also 18" rubber covered top press roll, pneumatic nip loading; complete felt equipment and Vickery conditioner.

One set of smoothing rolls located between press and dry parts, equipped with 24" upper rubber covered roll and 26" bronze cased lower roll, pneumatic nip loading.

Dry Part in two main sections having one upper and one lower felt in each section; first section comprising 16–60" paper and 4–60" felt dryers; second section comprising 16–60" paper and 2–60" felt dryers; improved type enclosed gearing; Bowser lubricating system; rope feed arrangement with automatic transfer



Line drawing of the new Puseyjones Fourdrinier Machine at Papierfabrik Utzenstorf, Switzerland. Designed and constructed for a maximum operating speed of 1200 feet per minute with Brown Bovari sectional electric motor drive. All rolls except bottom calender equipped with anti-friction bearings.



Puseyjones Crosses the Swiss Alps

This Puseyjones Fourdrinier Machine is now in operation at the modernized plant of Papierfabrik Utzenstorf, Switzerland. The addition of new equipment and complete improvement of existing facilities have made this Swiss mill one of the most modern and outstanding on the European continent.

From the improved type Flow Spreader to the 2-drum Winder, this new Puseyjones Machine incorporates the latest features in paper-making machine design and construction. It is producing news and directory paper at the rate of 75 tons daily.

Puseyjones Machines are in operation in the leading mills across the country, and in many parts of the world, giving continuous, quality production at high speeds. If you are thinking of modernizing or adding to your present equipment, then get the benefits of Puseyjones experience. Puseyjones engineers will be glad to discuss your problem. Write us today.

between sections; automatic motor operated felt tension control devices; improved type steam joints with dual revolving siphons.

Calender Stack comprising 8 rolls with independent Bowser oiling system for all roll bearings; pneumatic nip loading.

Pope type Uniform Speed Reel of improved design, with pneumatic adjustable loading mechanism.

Unwinding stands equipped with water-cooled brake and pneumatic tension device.

Puseyjones Winder with hydraulic operated roll unloading mechanism.

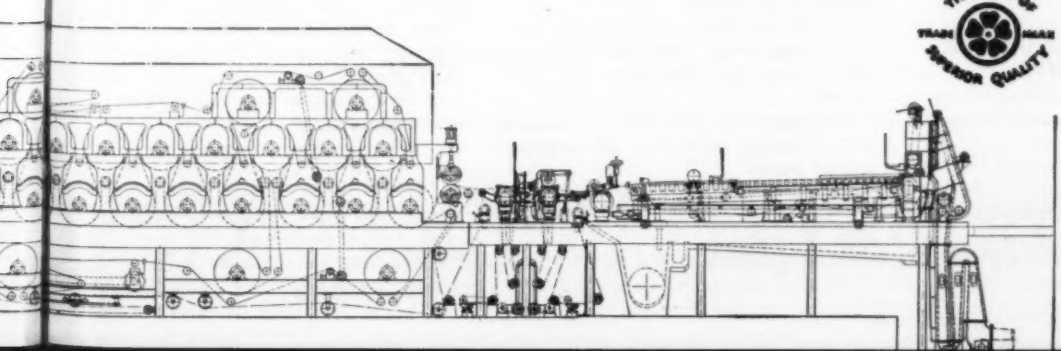
THE PUSEY AND JONES CORPORATION

Est. 1848. Builders of Paper-Making Machinery

Fabricators and Welders All Classes Steel and Alloy Products

Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY



Virginia; R. A. McDonald, Crown Zellerbach Corp.; A. K. Nicholson, Hollingsworth & Vose Co.; George Olmsted, Jr., S. D. Warren Co.; Irving Osborne, Jr., Cornell Wood Products Co.; Peter S. Paine, New York & Pennsylvania Co.; Cola G. Parker, Kimberly-Clark Corp.; Sidney M. Phelan, West Virginia Pulp and Paper Co.; H. Lee Rauch, Consolidated Paper Co.; J. L. Riegel, Riegel Paper Corp.; Henry D. Schmidt, Schmidt & Ault Paper Co.; Norman W. Wilson, Hammermill Paper Co.; W. B. Zimmerman, Howard Paper Mills.

Champion-International Installs Formal Program of Employee Relations

A formal program of employee relations has been inaugurated by Champion-International Co., Lawrence, Mass. All personnel matters previously were handled by production supervisors; the new program is the company's first attempt to centralize personnel relations administration.

King MacRury, former consultant in organization planning, industrial and industrial-public relations, has been named to the newly created position of director of personnel and management relations. Mr. MacRury, who comes to Champion from Oxford Paper Co., was at one time associated with McKinsey & Co., management consultants, and the National Industrial Conference Board, both of New York, and is the author of many articles on organization planning, employee relations and management communication.

C-Z Plans Construction of Two New Plants in Oregon

Contracts are being given for the construction of two new Crown-Zellerbach plants. Proposed cost of a new wood mill planned for the firm's West Linn, Ore., plant has not been announced, but it is known that the company is spending about $250,000 in preliminary work which will include addition to the bleach plant and the footings for the foundation of the wood mill.

Concurently, Zellerbach Paper Co., a merchandising division of C-Z, let the contract for the erection of a supplemental warehouse building in Portland, Ore. It will be a one story concrete structure with 40,000 square feet of floor space and a sprinkler system; reports indicate that it will cost from $130,000 to $140,000.

Hubbs & Lindemeyer Unite to Form New Corporation

With the formation of a new corporation, Hubbs Corp., Charles F. Hubbs & Co. and Henry Lindenmeyr & Sons, both of New York, have completed a long planned consolidation which will unite all facilities of the two firms. Each firm will continue to operate in its respective field as divisions of Hubbs Corp. Eventually, the two New York operations will be combined at one location. All officers and personnel of the two divisions will continue as before.

Only three officers of Hubbs Corp. have been elected. Richard C. Kettles, Jr., president of the Charles F. Hubbs division, has been chosen president of the new corporation; other officers are Charles J. Slicklen, executive vice president of the Charles F. Hubbs division, vice president; and George F. Gray, president of Henry Lindenmeyr & Sons division, treasurer.

I. P. Co. Building Two Plants To Produce Milk Cartons

Two new plants are being constructed by International Paper Co., New York, for the production of paper milk cartons. The plants, located at Atlanta, Ga., and Kansas City, Kan., will be of brick and steel construction, and will each employ about 100 persons. Combined production of the two plants is expected to be about 45,000,000 containers each month.

D. D. Milsom has been chosen as resident manager of the Atlanta factory, while C. S. Sturgis will hold the same position at Kansas City.

Gardner Contracts for Million-Dollar Box Plant

A contract has been awarded by The Gardner Board and Carton Co., Middletown, Ohio, for the construction of a new building which will cost approximately $1,000,000. To be erected near the present plant and offices of the Lockland, Ohio, division of the firm, the new building will serve as a retail box manufacturing plant.

Designed by Carl H. Martin, Middletown, the new building will be one story high, and will measure 447 x 282 feet. Construction will be of concrete, brick and steel.

Dryden Plans 4-Point Program

An improvement program planned by Dryden Paper Co., Dryden, Ont., Canada, will involve expenditure of about $935,000. With the improvements planned, the firm will achieve the goal of conversion of all pulp production into paper products.

Pertinent feature of the modernization program will include:

(1) Rebuilding the No. 2 paper machine, which has been out of service since 1948, for production of kraft papers

(2) Rebuilding the No. 3 machine for increased production of machine glazed papers

(3) Installing additional equipment on machine No. 4, so that its production may be increased

(4) Modernizing the power plant.

The entire improvement program will be completed by the end of 1951.

THE APPOINTMENT OF Southern Paper Co., Inc., Knoxville, Tenn., and Southern Paper Co. of Chattanooga, Chattanooga, Tenn., as agents for Hammermill Paper Co., Erie, Pa., has been announced.

CONTRACTS HAVE BEEN AWARDED to H. K. Ferguson Co. for the design and construction of a new pulp storage warehouse to be built by Chase Bag Co., New York, at Chagrin Falls, Ohio. The warehouse will be 86 feet x 218 feet, with a 25 foot clearance provided from the floor to the under side of the structural steel frame. Construction, which will begin the latter part of the month, will be completed early in 1951.

AFTER OPERATING AT A LOSS for the past three years, the Thomas M. Royal & Co. bag factory at Philadelphia served notices to 500 employees that it cannot continue to operate in the face of union wage increase demands. The union had refused to grant the fifty-year old company the right to lay off employees as it saw fit, and insisted on its right to determine the issue; the company found no solution but to cease operations.

A NEW BOX PLANT UNDER construction in Los Angeles for National Container Corp., New York, will be in operation within a month.

AN ULTRA-MODERN LOCKER and lavatory room is being built at Middletown, Ohio, for the use of employees of The Gardner Board and Carton Co. Constructed of reinforced concrete and steel, faced with red brick, the new two-story with basement building will be 203 feet long and 83 feet wide. Costing about $300,000, the new building will utilize the basement and first floor for warehouse and storage space, with conference rooms on the second floor; locker and lavatory facilities for 650 employees will utilize the remainder of the second floor.

THIRTEEN POSTGRADUATE FELLOWSHIPS and one postdoctoral fellowship in chemistry and chemical engineering have been granted by American Cyanamid Co., New York, to fourteen American universities for the academic year 1950-51. Each post graduate fellowship provides $1,200 for the student and $300 or full tuition, whichever is greater. The postdoctoral fellowship carries a stipend of $3,000 for the recipient.

Schooled to serve you...

YOU benefit when these men go to school!

These men are Standard Oil lubrication specialists, skilled and experienced in the use of modern lubricants. They are representative of the groups who come year after year from Standard Oil Company (Indiana) sales fields throughout the Midwest to learn about new machinery and the most up-to-date methods of lubricating them. In lecture rooms and in well-equipped laboratories, they are taught new ways to raise economy and efficiency of your operations.

The benefits held out to you by these lubrication specialists are multiplied by a service-distribution set-up that is unique in the oil industry. To serve your midwest operations, Standard Oil has located practically right in your own backyard a completely stocked warehouse and the office headquarters for a lubrication specialist. The nearness of this service-supply center *means faster deliveries to you* of necessary fuels and lubricants. It assures you of getting the product you need when you need it. It puts the services of the lubrication specialist at your immediate disposal.

These advantages are well worth investigating. Arrange, now, for the visit of a lubrication specialist. If your plant is located in any of the states below, simply phone your nearby Standard Oil service-supply center or write to: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

3 IMPORTANT ADVANTAGES

Standard Oil's Lubrication Service is especially geared to serve your midwest operations.

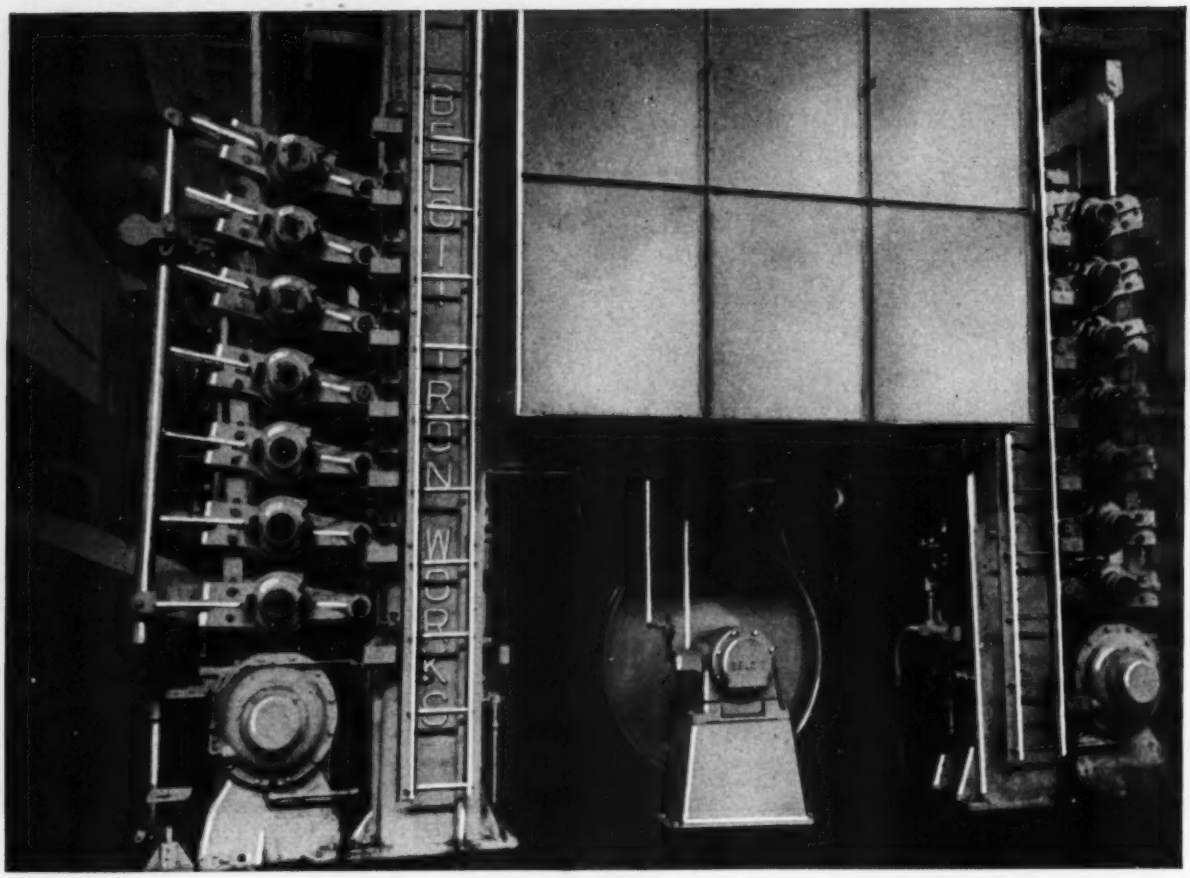
1 **SERVICE-SUPPLY POINTS** are near your plant. You are assured of fast deliveries, prompt lubrication engineering service.

2 **LUBRICATION SPECIALISTS** have been specifically trained in Standard Oil Lubrication Engineering Schools to help you obtain the maximum benefits from lubricants and fuels.

3 **RESEARCH AND TECHNICAL FACILITIES** are geared to help solve your specific lubrication problems.

Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Montana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin, Wyoming

STANDARD OIL COMPANY (INDIANA) STANDARD



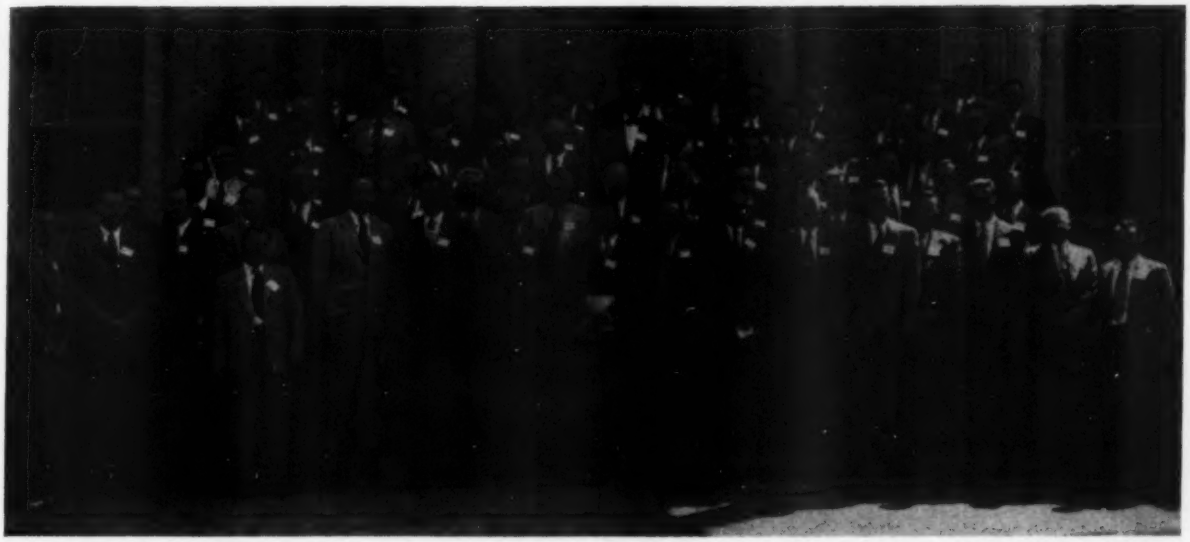
YOU CAN'T SHOCK THIS CALENDER MACHINE

Down in Fernandina, Florida, The Container Corporation of America has a 178-in. kraft board machine calender. It's a bruiser, tough and hard-working. It has to be to bear the name Beloit . . . built by the Beloit Iron Works. Shock loads are exceptionally heavy—plus considerable thrust loads—and misalignment must be compensated. So—it's only natural that SKF bearings were specified for both bottom and intermediate rolls. Time and again, SKF has demonstrated to the pulp and paper industry the ability to help put the right bearing in the right place. A continuing program of engineering and metallurgical research, strict control of every step of the manufacturing process contribute to efficient design of equipment. SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.,—*the Pioneers of the Deep Groove Ball Bearing, Spherical Roller Bearing, Self Aligning Ball Bearing.* 7144

SKF
BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

Integrity — Craftsmanship — Metallurgy — Tolerance Control
Surface Finish — Product Uniformity — Engineering Service — Field Service



Participants in the second lignin round table, held at Institute of Paper Chemistry, Appleton, Wis., Aug. 31 to Sept. 2.

Second lignin roundtable at The Institute of Paper Chemistry

Reported by: LOUIS E. WISE

▶▶▶ LIGNIN, AND the problem of its constitution and large-scale utilization, still challenges the pulp technologist, the chemist, physicist, the microbiologist, and the engineer. The conversion of lignin into a series of interesting and useful organic products (*via* vanillin) has been a highly significant and rewarding field of study, but it still fails to utilize the vast tonnage which is lost annually in our fields and forests, in the pulp mills and in our streams. Millions of tons still go to waste, and lignin is still our "number one" waste product, on which the paper industry in particular must focus its attention, and toward which some of its most important researches are now pointed. The field, however, is an extremely difficult one, and success in solving the structure of lignin or its over-all utilization requires time and co-ordinated effort.

Therefore, it is not surprising that the Institute of Paper Chemistry, Appleton, Wis., served as host to visiting chemists from the industries, the universities, and government laboratories who attended its Second Lignin Round Table on August 31 and September 1 and 2. A similar meeting had been held two years ago and was a marked success. Dr. Harry F. Lewis, dean of the Institute, served as general chairman and catalyst and various discussion leaders presented informally the progress in lignin research, and helped to stimulate discussions from the floor.

The entire meeting was highly spontaneous, and no stenographic notes were kept. In fact, discussions of the first two days of the meeting were not reported for the technical press. The final meeting on September 2, a session designed for representatives of the chemical industries, was an open one with permission for technical press releases.

The original meeting on Thursday morning was opened by Dr. Lewis, who introduced Dr. F. E. Brauns, chairman of the first session. Dr. Brauns, after giving a brief history of the studies devoted to lignin, turned the lectern over to Dr. George J. Ritter, of the Forest Products Laboratory, who discussed the methods used for determining lignin. Dr. Brauns then outlined the present status of lignin research, which evoked some animated discussions from the floor.

In the afternoon session, under the chairmanship of Prof. Joseph McCarthy, of the University of Washington, discussions of researches on the constitution of lignin were continued. Interesting talks were given by Dr. Manning A. Smith, of Bucknell University, and by Dr. C. R. Russell, of the Northern Regional Research Laboratory at Peoria. An important part of the afternoon meeting was the stimulating talk given by Dr. F. F. Nord on the possible biogenesis of lignin. Dr. Sidney Gottlieb, a contractor of the Office of Naval Research, spoke briefly on the microbiological degradation of lignin.

On Thursday evening, Dr. Lewis served as host to some of the men participating in the round table, and discussions continued informally well into the night.

Friday morning, Dr. Stamm presided, and the physical properties of lignin were discussed. This subject was introduced by Dr. James Thompson of the Institute staff. Following him, Dr. E. J. Jones, formerly of Masonite, and now research supervisor of Celotex Corp., spoke on the porous plate diffusion molecular weight method as applied to lignin. Current work on native lignin was discussed by Cecil Hess, now taking his Ph.D. in this field at the Institute. Infrared spectrographic studies on lignin were outlined by Walter Spearin, of the Combined Locks Paper Co. On Friday afternoon, Prof. Ralph L. Shriner of Iowa took the chair, presiding over discussions on the chemical reactions of lignin. Oxidation studies were discussed by Dr. I. A. Pearl, of the Institute, and hydrogenation studies were treated by Dr. E. E. Harris, of the Forest Products Laboratory.

On Friday evening, through the courtesy of Westbrook Steele, president of the Institute, (who was unable to attend the meetings) participants of the round table had an excellent lobster and/or chicken dinner at the Riverview Country Club.

On Saturday, Dr. Conrad Schuerch took the chair, and presided over an interesting session in which newer techniques of possible importance to lignin researchers were discussed. Dr. Lyman Craig, associate member of the Rockefeller Institute in New York, spoke on his famous countercurrent extraction techniques. E. E. Dickey showed the application of chromatography to lignin research. In the afternoon, under guidance of Dr. Lewis, the industrial appli-

cations of lignin were discussed in an open session which showed the present industrial uses and possible future uses of this puzzling by-product.

Many distinguished representatives

Paper mill companies and affiliated industrial companies were well represented at the conference. Also present were a number of outstanding personalities associated with well-known research and educational institutions, several from other countries. Two eminent Austrian lignin chemists, Dr. A. Wacek (of the Institut für Organische Chemie, at Graz) and Dr. Karl Kratzl (of the University of Vienna) were forced to cancel their trips to the U.S.A.

Universities:

Bucknell University—Dr. Manning A. Smith
Fordham University—Dr. F. F. Nord, Dr. W. J. Schubert
Illinois, University of—Dr. C. S. Marvel
Institute of Paper Chemistry—F. E. Brauns, B. L. Browning, M. A. Buchanan, E. E. Dickey, H. F. Lewis, I. A. Pearl, B. F. Shema, J. O. Thompson
Iowa, State University of—Dr. Ralph L. Shriner
Lehigh University—Dr. E. D. Amstutz
Maine, University of—Dr. Irwin B. Gouglass
Maryland, University of—Dr. Sidney Gottlieb, Dr. M. J. Pelczar, Jr.
Minnesota, University of—Dr. Ole Gisvold, Ralph Hossfeld, Wayne L. Meek, Prof. F. Smith
New York, State University of—Dr. Conrad Schuerch
Portland, University of—Dr. W. S. MacGregor
Saskatchewan, University of—Dr. J. M. Pepper
Washington, University of—Dr. Joseph L. McCarthy, Dr. David M. Ritter
Wisconsin, University of—Dr. J. W. Williams

Government Laboratories and Institutes:

Canada Dept. of Mines and Resources (Vancouver)—Dr. J. A. F. Gardner
Canada Dept. of Resources and Development (Ottawa)—Dr. F. Bender
Canada National Research Council Laboratories—Dr. J. E. Stone
Forest Products Laboratory—Dr. I. T. Clark, Dr. E. E. Harris, John C. Pew, Dr. G. J. Ritter, Dr. Theodore C. Scheffer, Dr. A. J. Stamm
Illinois State Geological Survey—Dr. G. R. Yohe
National Research Council—Dr. Glenn A. Greathouse
Ontario Research Foundation—Dr. H. Borden Marshall
Rockefeller Institute for Medical Research—Dr. Lyman C. Craig
Southern Research Institute—Dr. Lewis C. Wallace
U. S. Department of Agriculture and Northern Research Laboratory—Dr. Charles R. Russell

Paper Mills and Other Industries:

American Cyanamid Co.—Frederick D. Thayer, Jr.
Bathurst Power and Paper Co., Ltd.—J. Mck. Limerick, R. B. Robinson
Billeruds (Sweden)—A. E. S. Bjorkman
Celotex Corp.—Dr. Edward J. Jones
Champion Paper and Fibre Co.—Dr. Cornelius Betten
Combined Locks Paper Co.—Walter E. Spearin
Container Corp. of America—Peter B. Borlew
Coos Bay Lumber Co.—Dr. John G. Meiler
Crossett Lumber Co.—Dr. L. T. Sandborn
Crown Zellerbach Corp.—Dalton L. Pollet
Du Pont de Nemours & Co., E. I.—Dr. J. H. Shipp
Fraser Companies, Ltd.—Dr. F. Walker
Gaylord Container Corp.—Dalton L. Pollet
General Tire & Rubber Co.—Emert Pfau
Glatfelter, P. H., Co.—Dr. August S. Erspamer
Hercules Powder Co.—Dr. Paul J. McLaughlin
Hoberg Paper Mills—C. R. Faulkender, Leland J. Manders
Howard Smith Paper Mills Ltd.—Dr. G. H. Tomlinson II
Industrial Cellulose Research Ltd.—Dr. M. Wayman
Industrias Klabin do Parana de Cellulose, S. A.—Dr. L. Rys
International Paper Co.—Dr. K. A. Taylor, Dr. W. H. McPherson, Warren Lemke, Ed Bebie
International Paper Co. (Southern Kraft Division)—A. H. Dumaree, A. W. Pesch, C. W. Scott
Johns-Manville—Joseph Dec, Dr. Francis T. Ratliff
Kirk White Chemical Co.—Richard B. Chalker
Marathon Corp.—David Hogan, Robert Lovin, J. Richter Salvesen
Masonite Corp.—Robert M. Boehm
Masters Builders Co.—Paul T. Camp
Mead Corp.—David L. Brink, Dr. E. S. Flinn
Minnesota and Ontario Paper Co.—Dr. J. O. Burton, G. H. McGregor
Monsanto Chemical Co.—Dr. Hal G. Johnson, Dr. O. J. Weinkauff
Nekoosa-Edwards Paper Co.—Dr. H. W. Rowe
Northern Paper Mills—N. L. Malcove
Northwest Paper Co.—F. C. Schroeder
Ontario Paper Co.—Dr. Charles A. Sankey, Dr. J. H. Fisher
Puget Sound Pulp and Paper Co.—Dr. Gray King
Rayonier, Inc.—Dr. Paul Schlosser, Dr. L. H. Bock, Dr. R. L. Mitchell
Rhinelander Paper Co.—Dr. Karl W. Fries, J. Holderby
Union Bag and Paper Corp.—R. R. Chase, G. H. Doherty
West Virginia Pulp and Paper Co.—Dr. F. J. Ball, Dr. J. B. Doughty
Wyandotte Chemicals Corp.—A. L. Taylor

Chemical Linings now Has Working Arrangement with Nukem Products

Under a working arrangement, Chemical Linings, Inc., Watertown, N.Y., is now associated with Nukem Products Corp., Buffalo, N.Y. Nukem will continue the manufacture of acid and alkali resistant cements, membranes and protective coatings as well as its line of pumps, heat-exchangers, drains, etc., for handling corrosive liquids. The association will open up an entire new field to Chemical Linings, broadening its operations from the paper and pulp industry to serve the steel, chemical processing, and food processing industries which have been within Nukem operations for some time. In return, Nukem will receive additional outlets for its products in the paper and pulp industry.

Both corporations will continue to operate at their own locations as separate companies. Officers of Chemical Linings, Inc., are Murray H. Bennett, president; Elgin A. Branche, treasurer; and Leon W. Robb, secretary.

Flexible Tubing Corp. Moves Plant and Offices

Increased demands and production have caused Flexible Tubing Corp., now located at Branford, Conn., to begin construction of a new modern one story plant at Guilford, Conn. The new plant will have 13,000 square feet of floor space. The new building, to be made of brick and steel, will be occupied on November 15.

Selected with plans for expansion in mind, the plant will be on land in Whitfield St., Guilford, on the south side of the New Haven Railroad right of way. The plant will accommodate 100 employees, but is designed for many more. The transfer of operations will be done on a weekend, and no loss of working day time is expected.

Reliance Gains Control of Commonwealth Electric Co.

A controlling stock interest in the Commonwealth Electric Co., Ltd., Welland, Ontario, has been purchased by The Reliance Electric & Engineering Co., Cleveland. It is understood that the acquisition involved only a cash transaction; manufacture of transformers and electric motors, both Commonwealth products, will be continued at the Welland plant. In addition, operations will be expanded at Welland as rapidly as possible to permit the production there of Reliance V*S Drives and other specialized electric drives manufactured by Reliance.

The presidency of Commonwealth, open since the passing of Russel Stinson, will be filled by J. W. Corey, who will continue also as president of Reliance. In all other respects the Commonwealth organization will operate as heretofore.

Bingham Pump Completes New Testing Laboratory

As part of an expansion and modernization program, Bingham Pump Co., Portland, Ore., has completed one of the largest and most completely equipped hydraulic testing laboratories in the industry. The new laboratory is equipped to reproduce field conditions before shipment of all horizontal and vertical pumps and compressors.

The new testing facilities are capable of testing pumps with power requirements up to and including 3000 hp. Other equipment includes precision apparatus for extensive research by Bingham engineers in the subject of hydraulic design.

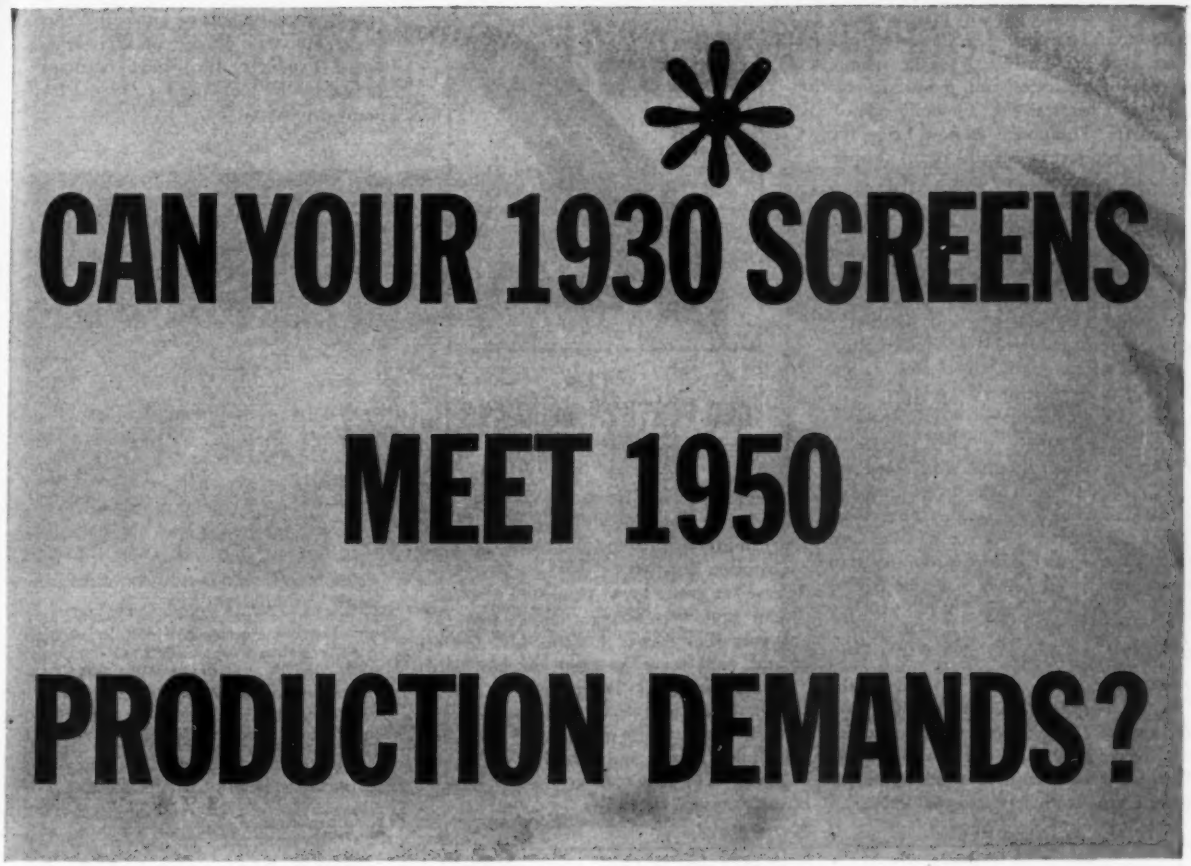
Niagara Alkali Co. Marks Its 50th Anniversary

In fifty years of work in the field of electrochemistry Niagara Alkali Co., New York, has made a notable record of achievements. Organized in 1900 under the name of Roberts Chemical Co., the firm has pioneered in electrochemistry in relation to chlorine and similar products, the latest of which is trichlorethylene of high stability.

Niagara's officers in the year of its fiftieth anniversary are J. Clarke Cassidy, president; S. Willard Jacobs, vice president; Stephen J. White, vice president and treasurer; and William J. Weed, manager of sales.

Nopco Pushing Work on Two West Coast Plants

Plans made by Nopco Chemical Co., Harrison, N.J., for the manufacture of industrial chemicals on the West coast are moving ahead rapidly. Two plants in Richmond, Calif., will be used in the



If your stock is still going through old Screens of limited capacity, or with relatively wide screen slots to make up for lack of capacity, your paper probably doesn't stand comparison with competitive grades screened through big, modern Bird Screens with fine cut plates.

That's no reflection on veteran Screens. It simply means that standards of capacity, of dirt removal efficiency and of screening economy have reached a different and permanently higher level.

Take a look at *your* Screens, now. If there's any question about their ability to do a 1950 screening job, check with screening headquarters — BIRD MACHINE COMPANY, South Walpole, Massachusetts.

Seven Hundred Bird Screens now in operation have already given twenty years or more of faithful service. They ought to be replaced by 1950 Model Bird Screens.

90% OF ALL THE PAPER MACHINES IN NORTH AMERICA ARE EQUIPPED WITH BIRD SCREENS

Pacific Division expansion program first announced last spring. A four-year-old plant is being converted to the manufacture of stearates and palmitates by Metasap Chemical Co., a wholly owned subsidiary. Equipment is now being installed; production should begin shortly after the first of next year.

Separated from the first plant by a large tract of company-owned land, the second plant is being fitted to produce chemical processing specialties and agricultural products marketed through the firm's Industrial Department. Formerly utilized for vitamin oil processing, the plant should be ready for its new use by the second quarter of 1951.

PURCHASE OF A TRACT of land 168 acres in area has been effected by Bjorksten Research Laboratories, Madison, Wis. The land, immediately outside Madison, will be used for erection of buildings to house new testing units, scientific equipment and laboratories.

A DIRECT FACTORY OFFICE has been established by Mason-Neilan Regulator Co., Boston, at 210 N. Appleton St., Appleton, Wis. John R. Redgrave, formerly Wisconsin and Minnesota representative for the firm, is in charge of the office.

THREE NEW AGENTS AND ONE new distributor have been added to the field organization of Flexitallic Gasket Co., Camden, N.J. Metrol Co., Detroit, will serve the entire lower peninsula of Michigan and the Toledo, Ohio, area, as agent; Illes Power Control Co., Cleveland, will serve as agent in Northern Ohio; Airdraulic Equipment Co., Buffalo, N.Y., will serve as Western New York and Syracuse agents. The new distributor, Power Specialty Co., Houston, Texas, will function in Eastern Texas and Western Louisiana.

Better Chemicals
for the Process Industries
Since 1815

AHCO PRODUCTS

Plants: Charlotte, N. C., Cincinnati, Ohio, Dighton, Mass.

- Defoamers
- Eveners
- Softeners
- Sulphonated Oils
- Wetting and re-wetting agents for wet-strength papers

For samples and research bulletins, contact your nearest AHCO office

ARNOLD-HOFFMAN
PROVIDENCE, RHODE ISLAND

Arnold, Hoffman & Co. Incorporated • Est. 1815 • Providence, Rhode Island
Offices: Charlotte; Cincinnati; New York; Philadelphia; Providence

SOME ELEVEN ACRES of land adjacent to the Sumner, Wash., plant of Fibreboard Products, Inc., have been purchased by the company for use in a large plant expansion.

COMPLETION OF A LARGE, MODERN trichlorethylene manufacturing plant at Ashtabula, Ohio, has been announced by Hooker-Detrex Inc., Ashtabula, a jointly owned subsidiary of Hooker Electrochemical Co. and Detrex Corp. Full production of the plant is expected to be achieved by November 1.

NORTH CAROLINA OFFICES of the Plaskon Division of Libbey-Owens-Ford Glass Co., Toledo, Ohio, were moved last month from Greensboro to 490 West Harper, Lenoir. Homer T. Yaryan, sales representative in the area, will continue to handle all glue and industrial resins accounts in Virginia and North and South Carolina.

FIVE MAJOR BENEFITS for employees were incorporated in contracts which were recently signed between officials of The Gardner Board and Carton Co., Middletown, Ohio, and union representatives. The contracts, which became effective July 31 and run for two years, provide for a graduated wage increase ranging from 2 to 7 cents for hourly paid employees and a 2 per cent increase for all salaried workers. Other provisions concern vacation pay, a seniority clause, a broader insurance plan, and a retirement plan.

SALES AND TECHNICAL SERVICE activities for the printing materials department of United States Rubber Co., New York, are being transferred from New York to 355 Valley St., Providence, R.I. Closer co-ordination between sales and production of such printing materials as newspaper cutting rubbers, newspaper blankets and inking rolls will be possible under the new plan of location.

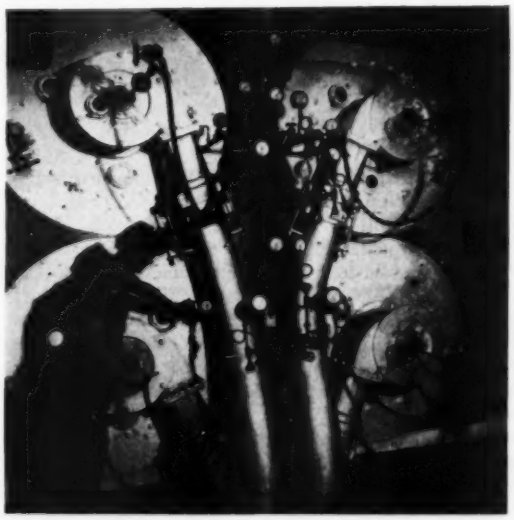
PURCHASED FROM The Ohio Boxboard Co., a large modern building will house a new branch office and ink service facilities of International Printing Ink. IPI will take over the building within sixty days, and conversion to ink making is scheduled for completion before the first of the year. The expanded facilities will replace IPI's nearby Wadsworth Branch.

A RECORD CLASS of 46 fire students—more than twice the size of any previous class—was graduated recently from the Ansul Chemical Co.'s customer fire training school in Marinette, Wis.

The Paper Industry Pictured Highlights

WISCONSIN'S FIRST PAPER MILL COMMEMORATED—D. C. Everest and Fred Boyce help dedicate memorial plaque in downtown Milwaukee during recent Superintendents divisional meeting. (See page 751).

SAFETY THREADER SUCCESSFUL—H. N. McAfoos installed his Neely Threader on top roll of wet calender stack in midwestern board mill. (see page 734).



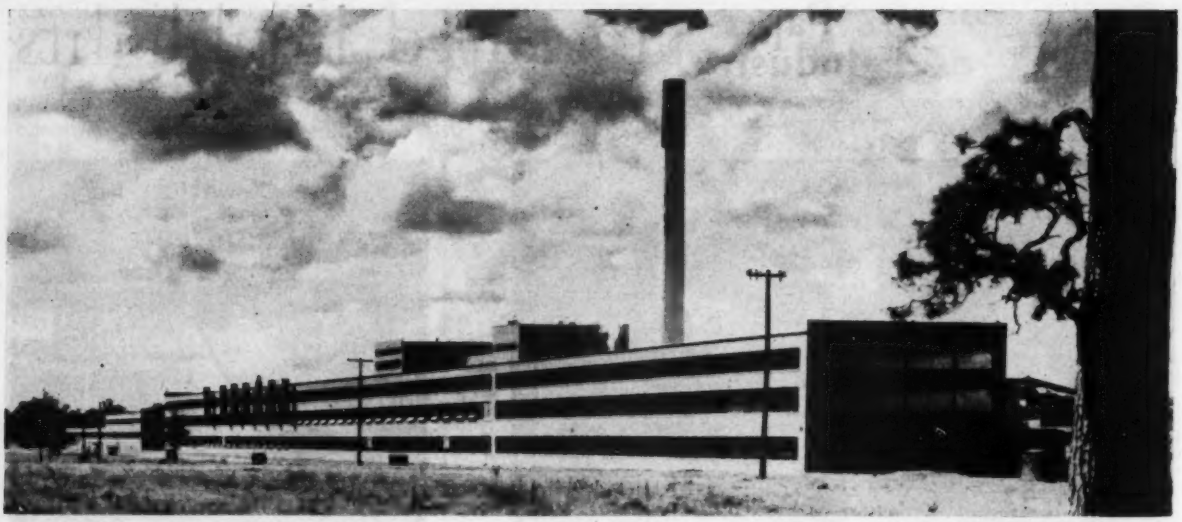
WASTE SULPHITE LIQUOR is burned with powdered coal in conventional furnace at Nekoosa-Edwards Paper Co. Combustion Engineering technicians aided in experiment.

VICE PRESIDENTS AT GOLF—Union Baggers (L to R) L. J. Doyle, A. Calder, Jr., H. S. Daniels, and D. J. Hardenbrook stop to pose during company's annual golf outing.

BEFORE—Unsurfaced roads made dusty driving; there are 50,000 miles of such roads in Wisconsin.

SULPHITE WASTE liquor is applied as road binder by Flambeau Paper Co., at Park Falls, Wis.

AFTER—Pleasant driving on treated road; it's one way to dispose of sulphite waste liquor (See page 751).



FIRST MILL in South, built to make dissolving pulp from hardwoods, now in production

International Paper Co.

Mill Manager East smiles as new Natchez plant goes into production

Supervisory Staff at Natchez

Mill Manager	I. Y. East
Production Superintendent	E. E. Ellis, Jr.
Technical Director	J. M. Van Hoose
Utility, Maintenance & Engineering Supt.	E. C. Guidroz
Paper Mill Superintendent	R. D. Jordan
Pulp Mill Superintendent	Emmett Jones
Chief Chemist	C. T. Hightower
Plant Engineer	T. C. Payne
Master Mechanic	Fletcher Poulan
Power Plant Superintendent	B. E. Lynd
Chief Electrician	C. W. Sawyer
Personnel Director	G. W. Biron
Safety Director	Frank Holland
Woodyard Superintendent	G. G. Boyd, Jr.
Wood Procurement Superintendent	D. V. Logan
Division Forester	A. K. Dexter
Mill Agent	J. T. Peninger
Purchasing Agent	J. W. Oenalager
Chief Accountant	B. F. Ritchie

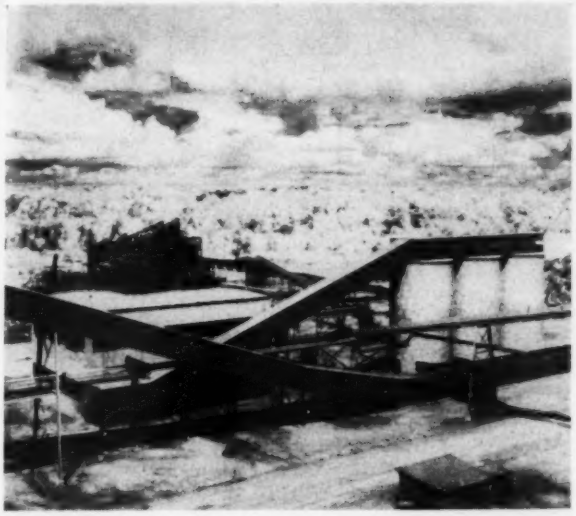
▶▶▶ ANOTHER CHAPTER WAS ADDED to papermaking history when the International Paper Co. put into production its new rayon pulp mill at Natchez, Miss. This historic city of the South, famed for its "Pilgrimage" each spring, welcomed industry on September 20 when State notables and I. P. Co. officials attended the opening of the new mill which employs entirely new methods of purification and bleaching, and uses the sulphate process for producing dissolving wood pulp. The mill will have an annual capacity of 100,000 tons of rayon pulp, increasing the present estimated North American output of dissolving pulp by about 13 per cent.

This new process combines the technical experience of International Paper Co. and its Canadian subsidiaries. It was developed by the Company's Southern Kraft Division with the technical advice of Industrial Cellulose Research Limited, a research affiliate of Canadian International Paper Co. which operates at Hawkesbury, Ontario, one of the world's foremost research and control centers for developing new techniques in the manufacture of dissolving wood pulps.

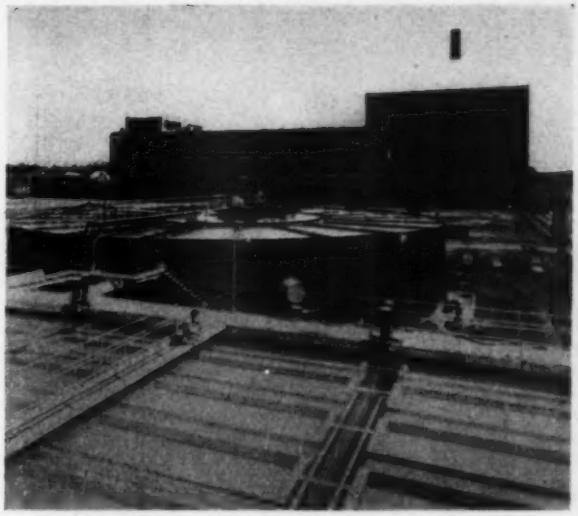
Thirty years of operating experience in this field is credited to the Canadian company. Its Kipawa mill at Temiskaming, Quebec, started operation in 1920 and was the first mill in the world designed and equipped specifically for the production of these specialized pulps. Through expansion of Kipawa and the conversion of two other pulp mills to dissolving grades, Canadian International's dissolving pulp capacity has now reached 225,000 tons a year. This, plus the 100,000 tons from the new mill at Natchez, will be sold through Riordan Sales Corp. Limited, an affiliate of Canadian International.

From hardwood to bleached pulp

Southern hardwoods, consisting mostly of gums with some bay, poplar, etc., are delivered to the mill by trucks and railroad cars. The wood is unloaded by cranes and by hand, depending upon the type of railroad car, to the storage yard



CHIPS CARRIED along these belt conveyors (Link-Belt) for storage in tile silos (Stebbins) before conversion into wood pulp



SULPHATE PULP MILL and bleach plant; water filters and Accelator in foreground

makes dissolving pulp at new Natchez mill

or to the flume conveyor. Wood from storage likewise will be handled by cranes to this flume conveyor, thence to process.

A chain conveyor removes the wood from the flume and delivers it to various mechanical conveyors for feeding two specially designed Worthington hydraulic barkers which operate at 1,200 pounds working pressure and will handle wood pulp logs approximately 5 ft. in length. All wood chip and chemical conveyors were furnished by Link-Belt Co.

After the barkers, the wood is sorted and the acceptable logs are chipped by a multi-knife chipper. The chips are screened and the oversize chips are rechipped to acceptable size. Chips accepted are then conveyed by belt conveyors to silos for storage. These tile-constructed chip silos were built by Stebbins Engineering, and the discharge mechanisms are plate feeders furnished by Link-Belt Co.

There are eight carbon steel digesters 13 ft. in diameter by 57 ft. in length. These were furnished by A. O. Smith Corp., and lined with carbon brick by Stebbins Engineering.

Digesters are loaded by belt conveyor directly from these silos. The chips are weighed for accurately determining the chip charge to each digester. A shuttle conveyor arrangement permits the loading of the various digesters, as required by the cycle. The chips are cooked in these digesters, which have circulating and auxiliary equipment furnished by Electric Steel Foundry Co. After cooking, the charge from the digester is blown into a blow tank, and from there the pulp is washed over the lime of Oliver brown stock washers.

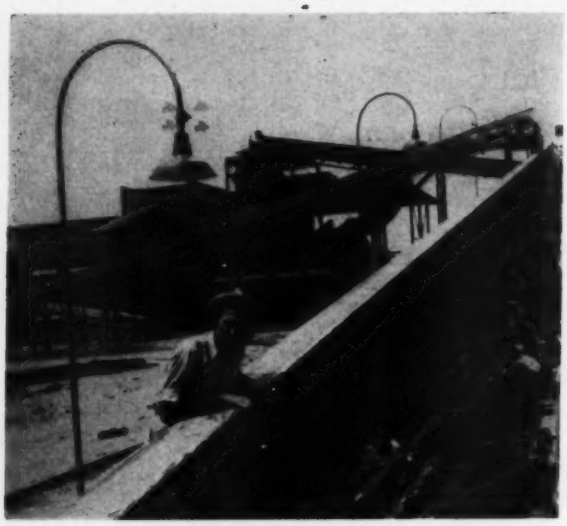
After washing, the pulp is screened on Waterous flat screen furnished by Montague Machine Co.; it is then thickened and further washed on deckers which discharge the stock into Kamyr storage chests. From these stock chests the pulp is pumped to a multi-stage Kamyr bleach plant employing both low density and high density stages with vacuum washers between stages. The bleached pulp is screened on Waterous flat screens and again thickened and further washed on Oliver deckers. These deckers discharge into Kamyr type stock chests which furnish the pulp drying machine. The furnish to the machine, after passing through jordans, is further cleaned by Vortraps just ahead of the head box of the Beloit fourdrinier machine.

Pulp forming machine

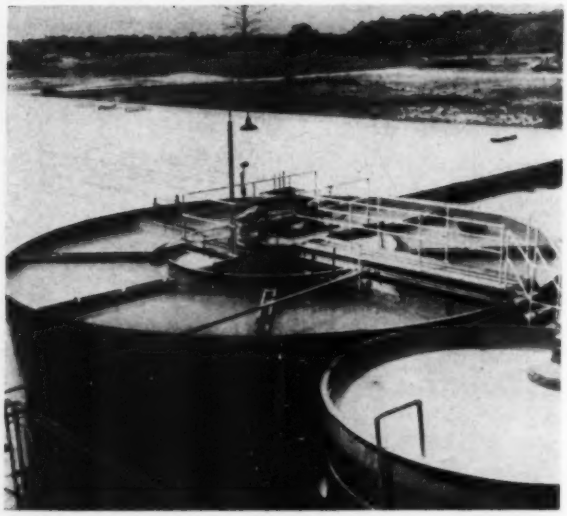
The Beloit machine (of 220-inch width) is equipped with enclosed mechanical gear drive provided with separate hypoid units at each station and designed for a maximum speed of 600 fpm with a line-shaft speed of 500 rpm. The head box of the machine is of special design; the distributor is constructed of stainless steel; the slice and pond sides of special cast brass, and the apron board Monel covered. The press section is of the Beloit vertical type, complete with felt stretchers and automatic felt guides and hand guide equipment.

The dryer part consists of 78 paper dryers, 60-inches in diameter, of the latest Beloit high pressure design and suitable for operation up to 125 lb. steam pressure. Dryers are divided into five sections, each complete with felt handling equipment and completely covered by a 302 ft. hood with seven 66-inch exhaust uptakes installed. The J. O. Ross Engineering Co. hood is constructed of Johns-Manville Transite in a removable panel form. A Ross-Grewin air system furnishes filtered air to the dryers. The Beloit heavy-duty reel has a 36-inch diameter constant speed reel drum, and provides for 84-inch roll diameters.

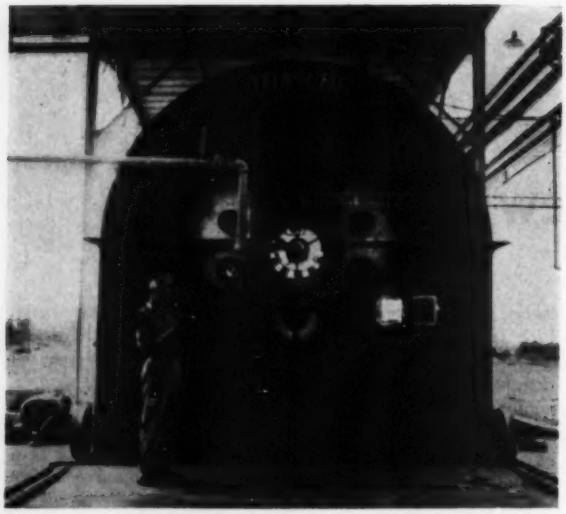
After drying on this machine, the rolls of pulp are cut into the required sheet size by a Beloit heavy-duty cutter, built for high speed operation, complete with Beloit slitters. From the cutter, the sheets are handled on a layboy and conveying system to three Baldwin 600-ton pulp baling presses. In this conveyor system, the bales of pulp are weighed, wrapped, and tied. Storage room is provided and equipped with overhead cranes for handling and storing of the bales from which it



Hardwood logs going to the wood mill

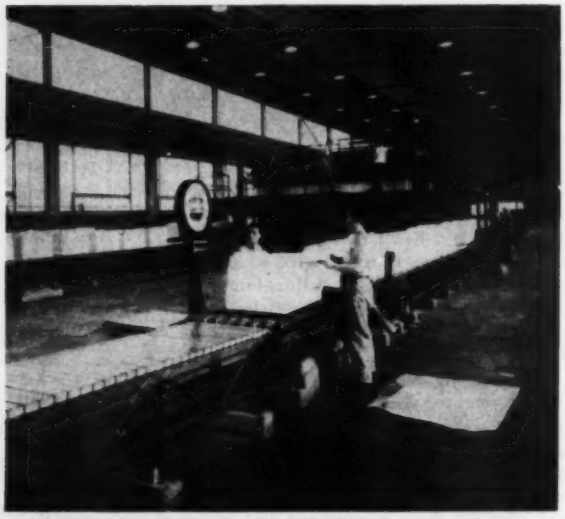


Small Accelator and large water storage well

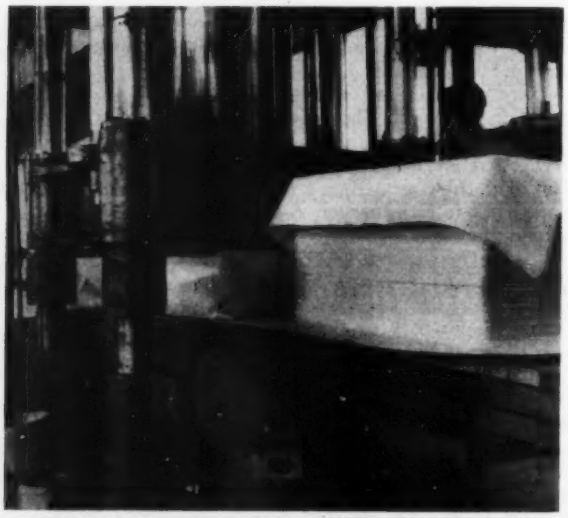


Lime mud from liquor making process is recovered in rotary kiln

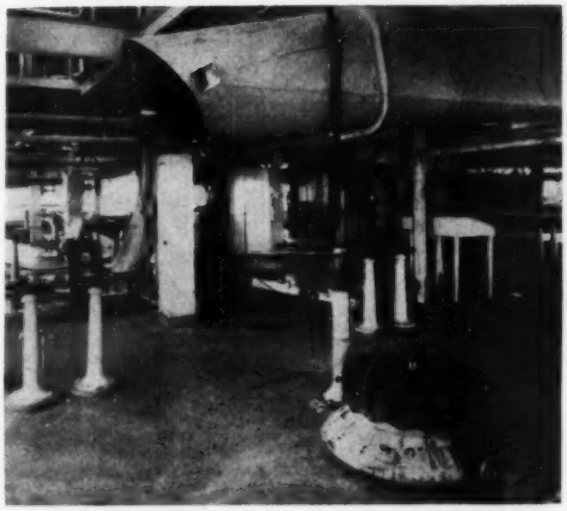
Bleached pulp is blended in tile constructed Kamyr type chests



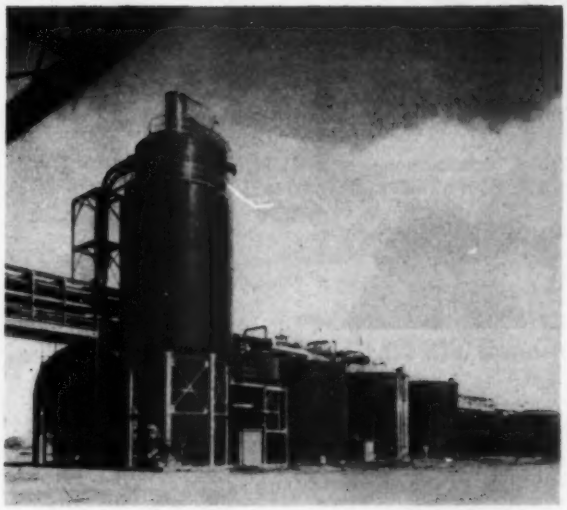
Sheet pulp from the cutter layboy is weighed before being baled



Weighed stacks of sheets are fed to a 600 ton Baldwin baling press

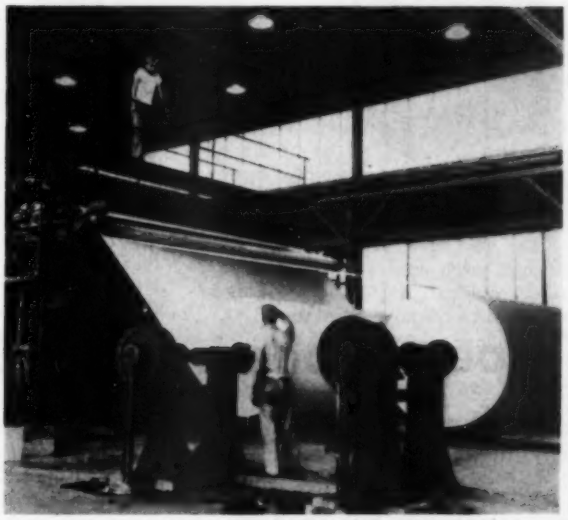


Operating floor of digester room



Digester blow tank and liquor storage tanks

Beloit fourdrinier type machine with 302 ft. J. O. Ross hood



Rolls of pulp on unwind stand of the Beloit heavy duty cutter

will be loaded directly from car level height loading platforms into railroad cars for shipment.

Chemical Recovery

Spent black liquor from the brown stock washers is evaporated by a set of Goslin-Birmingham long-tube vertical evaporators. Evaporated black liquor is burned in two B & W recovery boilers. Smelt from these units goes to dissolving tanks and is then pumped to the continuous Dorr causticizing equipment where it is clarified and causticized to produce sulphate cooking liquor. The lime mud from the caustic plant will be reclaimed by burning in a 10½ x 175 ft. lime kiln lined with Mexico refractories. It is fired by a Coppus fan-mixed gas burner. The kiln, furnished by Traylor Engineering Co., is driven by a high torque, two-speed 75-hp. electric motor. The flue gases from this kiln will pass through a scrubbing system, for dust collection, to a 7½ x 150 ft. high brick-lined, concrete stack.

Water treatment and fire protection

The water treatment facilities, which provide for softening and filtering, will treat about 30,000,000 gallons of water per 24 hours. The well system was installed by the Layne Central Co., while the water treating plant was furnished by Infilco.

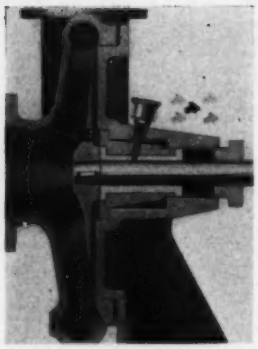
For fire protection, the Chicago Bridge and Iron Works built a 100,000 gal., 125 ft. ellipsoidal tank supported by pipe columns. This tank will service an automatic sprinkler system placed in all combustible places in the mill. The wood yard and other outside areas are adequately protected by strategically located hose houses. Two 2,500 gpm pumps, one motor driven and one turbine driven, are connected to the system for immediate use in an emergency.

Steam and power

The power plant has two General Electric turbo-generators, one 7,500 kw. and the other 6,000 kw. The electrical generation and distribution is at 4,160 v. The power plant switchgear, transformer load centers, and high voltage motor control were furnished by Westinghouse Electric and Mfg. Co., with General Electric Co. furnishing the motors and low voltage motor controls.

The boiler room consists of one 150,000 lb. per hr. bark burning boiler and one 150,000 lb. per hr. gas-fired boiler.

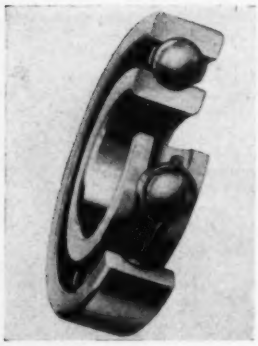
(Turn to page 730)



1—Internal sleeve bearing

2—Self-aligning spherical RB

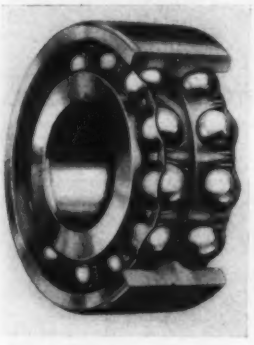
3—Self-align. 2-row bearing



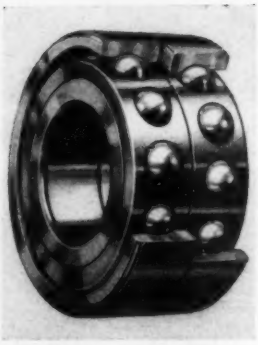
4—Single-row, deep groove BB

5—Double-row, deep-groove ball bearing

6—Single-row, angular contact ball bearing



7—Double-row, angular contact ball bearing



8—Single-row, angular contact bearings . . . back-to-back

Types of bearings used on centrifugal pumps

Part 8 of a series—all articles authored by Karassik and Carter

IGOR J. KARASSIK and ROY CARTER
Application Engineers
Worthington Pump & Machinery Corporation

▶▶▶ THE FUNCTION OF bearings in centrifugal pumps is to support the shaft or rotor in correct alignment in relation to the stationary parts under the action of radial and transverse loads. Bearings which give radial positioning to the rotor are designed as line bearings, whereas bearings which locate the rotor axially are called thrust bearings.

All types of bearings have been used for centrifugal pumps. Even the same basic design of pump is often made regularly with two or more types of bearings as required by varying service conditions.

Antifriction bearings most common

For the double-suction single-stage general service pump, two external bearings, one on either side of the casing, are used generally. Formerly, these bearings usually were of the babbitted type using oil lubrication. In recent years, however, most manufacturers have changed to antifriction bearings using either grease or oil lubrication.

Some of the small, inexpensive centrifugal pumps used for pumping clear liquids are provided with an internal sleeve bearing as shown in Figure 1.

Pump bearings may be of the rigid or of the self-aligning type. A self-aligning bearing is one made so that it will adjust itself automatically to a change in angular position of the shaft. In babbitted or sleeve-type bearings, the name is applied to bearings which have a spherical fit of the sleeve in the housing. In antifriction bearings, it is applied to bearings whose outer race is spherically ground or where the housing provides a spherical fit for the bearing.

The most common types of antifriction bearings used on centrifugal pumps are the various types of ball bearings. Roller bearings are used to a lesser extent, but the spherical roller bearing (Figure 2) is used frequently for large shaft sizes for which there is a limited choice of ball bearings. Most roller bearings are suitable only for radial loads, thus tending to limit their use on centrifugal pumps to bearings which are not required to carry a combined radial and thrust load.

Although double-suction pumps are theoretically in hydraulic balance, this is rarely realized in practice and even such pumps are provided with thrust bearings. A centrifugal pump is a product of the foundry and minor irregularities result. These irregularities may cause differences in the eddy currents set up on the two sides of the impeller resulting in an axial hydraulic thrust. Some form of thrust bearing, capable of taking thrust in either direction is, therefore, necessary to maintain the rotor in its proper position.

Features of Pump Bearing Application

Bearing Location

On horizontal pumps that have a bearing at each end, the bearing at the outboard end is known as the outboard bearing and the bearing at the inboard end, the inboard bearing. Pumps with overhung impellers have both bearings on the same side of the impeller. On these, the bearing nearest the impeller is the inboard and the one farthest away is the outboard. Generally when a pump is provided with bearings at both ends, the thrust bearing is placed at its outboard end and the line bearing at the inboard end.

Bearing Housings

The bearing housing is the part which houses the bearing and locates it in its correct radial position, concentrically with all the bored fits which form the pump running joints. The bearing housing fulfills the function of containing the lubricant necessary to the proper operation of the bearing. In thrust bearings, the housing also has the function of locating the bearings in its proper axial position.

Water Cooling

There is a certain amount of friction in every bearing, even in the antifriction type. As a result, every bearing when in operation generates heat, the amount of which depends upon the load on the bearing and the rotative speed. The heat, so generated, must be dissipated either to the surrounding air, or through some other medium. If the amount of heat generated is too much for air cooling, water-cooling becomes necessary. Thus, thrust bearings are more frequently water-cooled than line bearings. This can be accomplished either by circulating water (or other cooling liquid) through a jacket surrounding the bearing or by cooling the lubricating oil used in a forced feed oil lubricated bearing. Jackets are most generally used with antifriction bearings.

With pumps handling hot liquids, heat from the interior of the pump may be transmitted to the bearing housings and the bearings by radiation and by conduction along the shaft, thus adding to the problem. There are a few installations where pump bearings are cooled with air forced through ducts in the bearing housings by fans.

Bearing Brackets

The structural element used to support and connect the bearing housing to the pump is called the bearing bracket. It can be a separate piece or part of either the bearing housing or the pump casing or head.

If the bearing bracket of a pump is cast onto the pump casing, it is called an integral bearing bracket. Since the bracket is bored and otherwise machined at the same time as the casing is bored, correct alignment is assured. The bracket usually is designed so it acts as a pocket to collect the leakage from the stuffing box.

Pedestal Type Bearings

A pedestal type bearing is one in which the housing is supported on a flat surface, generally a pad on a bedplate or a sole plate. It is most advantageously used for radial loads. It was used quite extensively for centrifugal pumps in their early stages of development but has been generally superseded by the bracket type bearing, first because of easier alignment and, second, because of increased thrust loads resulting from higher head application. The pedestal type bearing is still used in connection with centrifugal pumps for supporting a separate jackshaft or an extension of the pump shaft for belt drive, for some belt drive pump designs, and in some large pump designs.

Generally, the thrust capacity of the bearing of a double suction pump is far in excess of the probable unbalance due to irregularities. This is done because (1) unequal wear of the rings and other parts may cause unbalance and (2) the flow of the liquid into the two suction eyes may be unequal because of an improper suction piping arrangement which may cause an unbalanced condition hydraulically.

Ball Bearings

Coefficient of rolling friction is less than that of sliding friction. One must, therefore, not consider a ball bearing in the same light as a sleeve type bearing. In the former, the load is carried on a point contact of the ball with the race but the point of contact does not rub or slide over the race and no appreciable heat is generated. Furthermore, the point of contact is constantly changing as the ball rolls in the race and the operation is practically frictionless. In the sleeve type there is a constant rubbing of one surface over another and the friction must be reduced by the use of a lubricant.

Ball bearings operated at an absolutely constant speed theoretically would require no lubricant. However, no speed can be called absolutely constant as the conditions affecting the speed will vary slightly; for instance, a motor whose full load speed is given at 3510 rpm might vary in speed in the course of a minute from 3505 to 3515 rpm. Each variation in speed has the effect of causing the balls in a ball bearing to lag or lead the race because of their inertia. This means that there is a very slight sliding action taking place, almost immeasurable, but existent. Another point is that the hardest of metals on carrying load suffer minute deformations, and we do not quite have point contact and, therefore, have another slight sliding action. For these reasons ball bearings must be given some lubrication.

Ball thrust bearings are built to carry heavy loads by pure rolling motion on an angular contact. Since thrust load is axial it is equally distributed to all the balls around the race and the individual load on each ball is only a very small fraction of the total thrust load. In bearings of this type it is essential that the balls be very equally spaced, and a retaining cage is used between the balls and between the inner and outer race. This cage carries no load, but the contact between it and the balls produces sliding friction which generates a small amount of heat. It is for this reason that ball thrust bearings are generally water jacketed.

Type and applications of ball bearings

Most common types of ball bearings used on centrifugal pumps are the single-row, deep-groove type; the double-row, deep-groove type; the double-row, self-aligning type, and the angular-contact type, made both in the single- or double-row type. All except the double-row, self-aligning type are capable of carrying thrust loads as well as radial loads. The ball thrust bearing formerly was used for carrying thrust only in conjunction with babbitt sleeve bearings but now is used rarely on centrifugal pumps. Sealed type ball bearings, adapter type ball bearings, and other modifications of ball bearings also have some application in special cases.

Self-aligning types of ball bearings (Figure 3) are the most serviceable type for heavy loads, high speeds, long bearing spans, and no end thrust. For this reason, they are ideally adapted to service as line bearings on a centrifugal pump. The double row of balls run in fixed grooves in the inner or shaft race and the outer race is ground to a spherical seat. Any slight vibration or shaft deflection is, therefore, taken care of by this self-aligning bearing which operates as a pivot.

In cases where lightly constructed pumps are used, "breathing" may take place in the casing when pressure is developed and this type of bearing is desirable, as the slight misalignment caused by breathing will be compensated in the bearing. This type of bearing has been very satisfactory for high speeds and long life, even with long bearing spans. It has very little thrust capacity and is not used for combined radial and thrust loads in centrifugal pumps. With large shafts, the self-aligning spherical roller type (Figure 2) is used instead of the self-aligning ball bearing. The self-aligning spherical roller, unlike the ball bearing type, can carry a combined radial and thrust load with a considerable thrust component.

Single-row, deep-groove ball bearings (Figure 4) are the most favored by the bearing manufacturers as it is applicable to so many services and permits standardized production methods. This bearing is capable of carrying both radial and axial loads and, for conservative speeds, low end thrusts and short spans, this bearing is very satisfactory.

Double-row, deep-groove ball bearings (Figure 5) are in effect two single row bearings side by side and has greater capacity both for radial and thrust loads. It is used quite generally when the loading is more than permitted by the single row type.

Angular-contact ball bearings operate on a principle which makes it good for heavy thrust loads. The single-row type (Figure 6) is good only for thrust in one direction while the double-row type (Figure 7) which is basically two single row bearings back to back, can there-

fore carry thrust in either direction. Two single-row angular-contact bearings are frequently matched and the faces of the races ground by the bearing manufacturer so they can be used in tandem for large one directional thrust loads or back-to-back (see Figure 8) for two directional thrust loads. In some cases, the two bearings are locked together by recessing the inner races and pressing them onto a short ring. When two separate angular-contact bearings are used, care must be taken to mount them correctly on the shaft.

Single-row angular-contact ball bearings can only be used singly on centrifugal pumps when there will be a thrust at all times in one direction and thus, its field of possible application is limited primarily to vertical pumps. One other very interesting application of the single angular-contact bearings is the use of two such bearings in an end suction pump to take care of the axial thrust in either direction. This arrangement permits a certain amount of axial adjustment of the impeller in its volute by loosening up on one bearing nut and tightening on the other. Unfortunately such adjustment is extremely delicate and requires a first class mechanic. Its commercial practicability is, therefore, somewhat limited.

Double-row bearings, or the equivalent of a matched pair mounted back-to-back, have been found satisfactory where there is a possibility of a high thrust load in either direction. Some pump manufacturers standardize on this double-row angular-contact type for combined radial and thrust bearings and use this type for many applications.

International Paper Co. makes dissolving pulp . . .

(Continued from page 727)

Each boiler is identical except that one unit has a Detroit Rotograte stoker under it for the purpose of burning both wood refuse and gas, while the other is for gas fuel only. The wood refuse is furnished to the stoker by a Hofft feeding machine from a bark storage bin. Both boilers are designed for an operating pressure of 600 lb. with various components such as a continuous type loop tube economizers, superheaters and air heaters. The induced draft fans for each boiler were furnished by the American Blower Corp. and the forced-draft fans by B. F. Sturtevant. Natural gas used as fuel for these two boilers is furnished from a local gas field in that area.

The recovery room has two modern 250-ton Babcock and Wilcox Tomlinson chemical and heat recovery units. Evaporated black liquor is burned in these two furnaces, equipped with superheaters and economizers, and the steam generated at 600 lb. psi per sq. in. is utilized throughout the mill. The recovery furnace flue gases pass through the Koppers electrostatic precipitators for removing chemicals and reducing odor and contamination to the air, and thence through a 300-ft. brick and concrete chimney into the atmsophere. This chimney was constructed by the Rust Engineering Co.

General offices—cafeteria

The main office is a two-story, brick, concrete and steel structure. The floors are covered with plastic tile, and the building is completely air-conditioned. The offices of the mill manager and his staff, the mill agent, purchasing agent, accounting department, personnel department, timekeeper, and the woodlands department occupy this building.

The utility building is a two-story structure of brick, concrete and steel. Part of the second story of this building is used for offices for various department heads, while the supply house uses the balance for storage. The first floor houses the cafeteria, first aid, laboratory, locker and bathrooms, supply house, and maintenance shops. The cafeteria, first aid, and laboratory are constructed with walls of glazed tile, and air-conditioned. These departments are very modern and completely equipped. The laboratory has a constant humidity room. The machine shop housed in this building is modern in every respect and is equipped to handle almost any type of machine work.

The mill area proper, consisting of approximately 540 acres, is fenced with steel cyclone fencing. The entire site is graded properly to take care of the necessary drainage and eliminate erosion of the peculiar type soil found here.

The woodyard area covers approximately 13¾ acres and is illuminated by a total of ninety-six 1,500-watt floodlights mounted on eight 75-ft. steel towers.

The communication system for this mill is an automatic telephone exchange, operated on 24 volt d-c. This exchange also handles the code-calling system throughout the mill.

Where does the wood come from?

Trees are by far the greatest of the Southern crops in acreage today. Approximately 183,000,000 acres are covered with commercial forest. (The second largest crop acreage is corn, with less than 26,000,000 acres.) The South, with its wealth of sunlight and rain and fertile forest soils, now accounts for 40 per cent of the total U.S. production of lumber and 50 per cent of the total U.S. production of pulpwood.

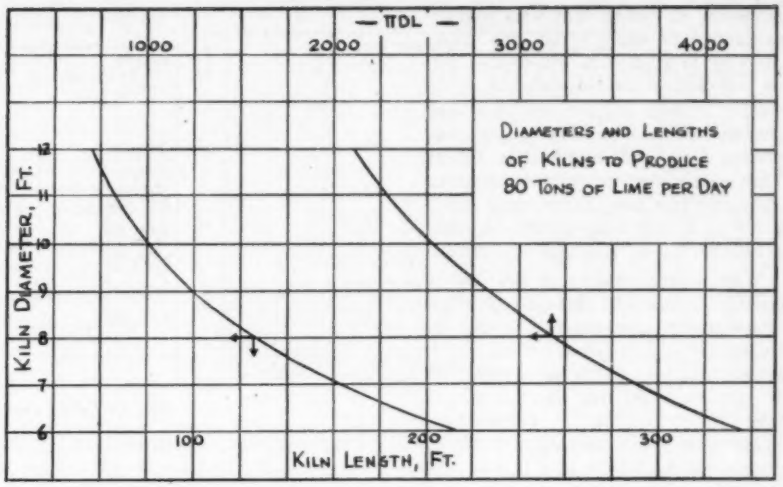
In 1949, 93 per cent of all the wood used by International Paper Company came from farmers and private woodland owners, and the Company expects to spend about $35,000,000 this year in the South in buying pulpwood.

About conservation

The Southern Kraft Division of International Paper Company maintains an organization of more than 135 foresters. It has a special force of conservation foresters whose main responsibility is to work with the people of the states to which they are assigned in every constructive effort which will encourage good forest management.

During 1949, these conservation foresters delivered messages on conservation through exhibits and meetings of various kinds to 992,895 people. They had 2,784 personal contacts with pulpwood producers, woods laborers, public foresters, and others. Supplying forestry information, they visited owners of 310,377 acres of forest land. They helped mark for cutting the timber on 1,100 privately-owned forest properties involving 79,980 acres of forest land.

During 1949, the Company built 156.6 miles of new roads and maintained 2,100 miles as part of its fire control work throughout the South. Nearly 6,000 miles of firebreaks were ploughed in 1949 by the Company.



Economics + thermodynamics determine optimum kiln size

RALPH E. GIBBS
Consulting Chemical Engineer

It's not hard to determine the most economical size lime kiln for your kraft recovery operations, especially when Author Gibbs shows you how. He has written a number of articles for *The Paper Industry* during the past couple of years which have aided in understanding the fundamental thermodynamics of rotary kiln lime burning.

▶▶▶ THE OPTIMUM PHYSICAL dimensions of rotary kilns, if they are to perform at their greatest possible economy, will depend upon economic and thermodynamic factors. Of primary interest to the usual purchaser is a specific daily output. Seemingly of secondary concern is the possible economy of the unit. Actually, they should be tied very closely together.

Selection of a kiln of the proper size to produce some optimum daily tonnage of reburned lime should not be difficult. But this in itself is no assurance that the unit will be economical with fuel and not extravagant in first cost. Only by tying in the economic factors with the thermodynamic factors can a kiln be selected that will make possible the choice of the most economical size of kiln. Depending upon the system of processing, the thermodynamic factors will remain constant. The economic factors will vary through all possible extremes.

A common practice is to set up empirical or arbitrary relations between the length and diameter of the kiln shell and postulate these as the economical ratio. The author has been guilty of this error. On the other hand, no means have been available for establishing this important feature of the unit other than to select from practice certain kilns that were outstanding in their performance and attribute this to a happy ratio of their physical proportions.

Quite obviously, some economical proportion does exist. Kilns of different diameters and lengths are capable of producing identical tonnages of lime per day. Purely as an example, assume a kiln of such sizes as to produce 80 tons of lime per day is to be selected.

From the empirical relation for the daily production rate of the kiln $T_d = kD^2L/100$ it is noted that T_d ordinarily is the dependent variable, the value of which is fixed by the values of D and L, the diameter and length respectively of the kiln shell. However, if we make L the dependent variable and T_d constant, then the value of L will be a function of the value of D.

Kiln sizes to produce 80 tons of lime per day

D	L	piDL	R_s
6	222	4180	37.0
7	163	3580	23.3
8	125	3140	15.6
9	99	2800	11.0
10	80	2510	8.0
11	66	2280	6.0
12	56	2100	4.7

Thus if it is assumed that T_d is 80 tons per day, and that the production coefficient has a value of 1.0 (k), then $L = 100\ T_d/kD^2 = (100 \times 80)/1.0\ D^2 = 8000/D^2$. The table and graph illustrate this relation. Included in the table is the kiln shell surface area and the kiln shell ratio of length to diameter.

The seasoned engineer's judgment will make him shun, without serious consideration, the 6 x 222 ft. kiln and the 12 x 56 ft. kiln. Instinctively, he will feel they are out of good proportion. For one thing, the kiln shell surface of the first is almost double that of the last. Obviously, too, the largest kiln diameter listed is too short in length. Somewhere between these kiln sizes will be found the optimum.

The 7 x 163 ft. and the 11 x 66 ft. are studied next. Quite as obviously, the 11 x 66 ft. kiln is too short. The same goes for the 10 x 80 ft. and the 9 x 99 ft. kilns. This leaves the 7 x 163 ft. and the 8 x 125 ft. kilns to select from. Which shall it be?

With no more than his experience and

judgment to guide him, the engineer probably will select as his first choice the 8 x 125 ft. kiln. It will require only 88 per cent of the shell surface of the 7 x 163 ft. kiln, and will require at least one set less, and possibly two, of supporting tires and trunions or rollers. Thus its first cost and maintenance costs should be less also. Furthermore, the 8 x 125 ft. kiln is long enough to assure a reasonable exit kiln gas temperature.

With a feed holding 50 per cent of moisture, what will these exit kiln gas temperatures approximate? Using the empirical relation given in an earlier article, $T_{gw} = (4700 + 1550D)/R_k + 287 - 200Rf$, for the 7 x 163 ft. kiln $T_{gw} = [4700 + (1550 \times 7)]/(163/7) + 287 - 200 \times 1.0 = 757$ F., and for the 8 x 125 ft. kiln $T_{gw} = 4700 + (1550 \times 8)/(125/8) + 287 - 200 \times 1.0 = 1177$ F.

These temperatures of exit kiln gases represent quantities of waste heat. How much heat is represented in each case? And what does the difference amount to?

In a previous article the pounds per hour of gases leaving a kiln using a feed with 50 per cent of water was given by the relation $W_{gt} = D^2(572 + 1.95L)$. Thus, for the 7 x 163 ft. kiln $W_{gt} =$ 44,000 lb. per hr. and for the 8 x 125 ft. kiln $W_{gt} =$ 52,100 lb. per hr.

The quantity of heat leaving the kilns can be approximated by the relation Btu per hr. $= W_{gt} \times \Delta T \times 0.27$ so that the heat in the gases leaving the 8 ft. kiln will be 52,100 (1177 F. − 70 F.) x 0.27 = 15,500,000 Btu per hr., and for the 7 ft. kiln 44,000 (757 F. − 70 F.) x 0.27 = 8,150,000 Btu per hr.

From this it is seen that the gases from the 8 x 125 ft. kiln are carrying to waste 7,350,000 more Btu per hr. than the gases from the 7 x 163 ft. kiln. This 7,350,000 Btu per hr. represents 545 lb. of coal per hr. or 52.5 gallons of Bunker C oil per hr. And with a production rate of 80 tons per day of lime, or 3.34 tons per hr., the difference in fuel requirement per ton of product is indicated to be nearly 168 lb. of coal, or 15.7 gal. of Bunker C oil.

With coal delivered to the kiln at $6.00 per ton or 2000 lb., this is equivalent to 50c per ton of lime. With oil delivered to the kiln at 6c per gal., the equivalent cost will be 94c per ton of lime.

In other words, the fuel cost will be greater with the 8 x 125 ft. kiln than with the 7 x 163 ft. kiln. On the other hand the 7 x 163 ft. kiln will have a higher first cost and higher maintenance costs than the 8 x 125 ft. kiln. The economic balance will be attained when these costs are equalized. With the factor of kiln costs being equal, it will be more economical to have a short kiln when fuel is cheap, and a longer kiln when fuel is high priced.

EQUIP. NO. 529-12-11	NAME No. 3 Bauer Refiner	DEPT. Groundwood
INTERVAL 1 Month	OPERATION Inspection	BY C. A. Hale
DATE OPERATION PERFORMED		
1/3/50		
2/7/50		
3/7/50		
4/4/50		
5/2/50		
6/6/50		
7/5/50		
MAINTENANCE TICKLER FILE CARD		

Fig. 1—Tickler card file tells when equipment should be inspected

Preventive maintenance pays dividends

Fourth in a series on the subject of maintenance methods and practices, this article summarizes the reduction in operating costs effected when management applies a maintenance program. Each article has been prepared by Wallace Clark & Co. engineers. Mr. Winton authored the first one, was co-author of the second.

PETER F. GAYNOR, JR.
and
C. C. WINSTON
Senior Staff Engineers
Wallace Clark & Company

Peter F. Gaynor

C. C. Winston

▶▶▶ SCHEDULED EQUIPMENT inspections and lubrication checks combine to form the core of real preventive maintenance. By performing them correctly, machine downtime in the mill may be anticipated and minimized.

In our experience in paper mill maintenance installations, we find that the bulk of formal inspections (if there are any) are confined to the major equipment in or adjacent to the machine room. Generally, the responsibility for equipment inspections made in other departments falls to the lot of departmental millwrights. These men may, or may not, have had the technical ability required to detect and correct by minor adjustment or repair, a condition that eventually might shut down a piece of equipment for major overhaul. This system of decentralizing responsibility for preventive maintenance usually precludes any formal recording of the results of inspections and the remedial action taken to reduce future downtime.

Whose responsibility?

Preventive maintenance programs are a direct responsibility of the electrical and mechanical maintenance departments. Therefore, they must be initiated and administered by the electrical and mechanical superintendents, if these men are to discharge fully their responsibilities.

These key personnel should know the current condition of all equipment in their charge. They, too, must determine the desired inspection interval for *routine* and *periodic* inspections for each piece of equipment. We classify routine inspections as those performed weekly or more often, while those

done at greater than weekly intervals are considered periodic inspections.

Routine inspections similar to daily lubrications are performed on a route, or patrol, basis. Periodic check inspections particularly should be the responsibility of senior maintenance personnel. This type of inspection is "called-up" by a maintenance tickler card file. The individual equipment tickler file card appears as Figure 1.

Use tickler file

This tickler file tells each week what inspections are due. The operation of the file is a part-time job for a clerk in the maintenance office. On the inspection sheet the clerk lists the equipment number, name, and location of the machines scheduled for inspection during the current week. If inspection reveals that equipment is in satisfactory condition, only the date of inspection is noted on the sheet after the equipment listing. If maintenance work is required on equipment, the inspector relays the information to his foreman or to the maintenance superintendent who rechecks the condition. If repairs are indicated, a job order is issued. This describes the work required and the date when the repairs must be completed. When the repairs have been made the job order is closed out. The job order number, date of completion, brief description of the work, and cost data are posted to the back of the equipment record card appearing as Figure 2. A similar cycle is started if the Route inspectors or oilers report any "out of the ordinary" conditions.

Reduce maintenance cost

This cost maintenance history is a powerful tool for maintenance cost reduction, if careful periodic engineering analyses are made. The data are helpful in:

1. Pointing up repetitive jobs on a piece of equipment

2. Indicating the need for redesign of elements or assemblies in a piece of equipment

3. Preparing annual maintenance budgets

4. Determining when to replace equipment whose maintenance cost is excessive

5. Furnishing a guide for selecting replacement equipment

6. Providing a guide in ordering or manufacturing spare parts

A gauge of the effectiveness of the inspection effort can be made by a monthly review of the job orders covering repairs. If 90 per cent or more of the job orders are initiated by maintenance personnel, inspection is "paying off."

JOB ORDER REPAIRS — EQUIP. No. 509 - 7-17

Date	J. O. No.	Description of Repairs	Labor Cost	Mat'l. Cost
1/8	22	Make 36 - 7/8"X7-1/2" C.S.H. Bolts	17.08	8.50
1/28	363	Weld flat iron to enamel iron	4.74	.28
2/26	736	Weld plates on flights	4.40	.28
3/16	900	Make 28-7/8"X7-3/4" C.S.H. Bolts	19.80	4.68
3/23	507	Weld plates to channel iron	4.46	.25
3/25	925	Drill 12 strap irons for wood screws	5.20	
4/3	1047	Weld take up	7.44	
4/4	1130	Weld plates on blocks	7.74	.42
4/8	1026	Repair flopper	9.11	.51
4/8	1123	Make new shaft for # 17 conv. drive	28.06	12.30
4/11	536	Install new shaft on # 17 conveyor	99.85	18.27
4/12	1183	Make 24 wood blocks for incline ret.	15.64	8.80
5/6	1406	Make 12 pcs. 1/2X2X5-1/2" Fl. Iron Drill 5/16"	3.58	1.03
5/14	1440	Make 36-7/8"X7-1/2" C.S.H. Bolts	17.46	2.90
5/22	1584	Drill & Weld parts on channels	10.82	2.85
5/27	1473	Make 4-3/4"X 4" U Bolts	2.40	.40
5/29	1663	Repair flopper	16.09	
6/3	1541	Repair flopper	19.98	2.06
6/9	1775	Make new flopper	20.24	10.08

Fig. 2—Cost records for individual pieces of equipment provide basis for maintenance cost analysis

Every maintenance craftsman is not necessarily a good inspector. Insure that each man selected:

1. Knows the papermaking process, at least from a practical standpoint

2. Understands the operating characteristics of each piece of equipment scheduled for his inspection

3. Has sufficient knowledge of the details of the construction of this equipment to diagnose readily any irregular operation

An equipment inspector should never be selected merely because he may appear to have some spare time to work in the inspections with his normal duties. If there is no person presently in the organization with the required skill and background, develop one or more in your mill or bring in a capable man to do this work. Similarly, the oiler should not be regarded as merely a "grease monkey." Skilled mechanics do a better lubrication job for less money.

Equipment inspectors must be competent

In some mills we have found it desirable to create in the maintenance department a new job with the title, *equipment inspector*. This man is charged with the responsibility of carrying out the preventive maintenance program in regard to inspections and lubrications. He is brought into the official family as a special assistant to the maintenance superintendent. The right man in this job can do much to reduce unscheduled shutdowns.

You have in your maintenance department one or more men whom you consider specialists on pumps. These men should be used initially to establish desired inspection intervals and then to make all pump inspections when the program is under way. The same routine should be followed for the inspections of the fourdriniers, conveyors, elevators, drives, valves, and piping.

In a recent preventive maintenance installation in a specialty mill, we selected one experienced man from the maintenance department to perform the periodic mechanical inspections of all mill equipment. His heavy experience, starting as an apprentice in the machine shop, permitted him to diagnose trouble quickly and correctly, and to write job orders describing intelligently the work to be done.

After one morning tour of inspections, he initiated eleven maintenance job orders of varying degrees of importance. In two cases his inspection and the subsequent temporary repairs on the job orders prevented imminent forced shutdowns, allowing continued operation until the Sunday shutdown period when permanent repairs were made to equipment.

Keep track of savings

To the average mill manager it may appear difficult to determine the savings resulting from a sound, preventive maintenance program. These savings can be measured by keeping a running record of unscheduled downtime of the paper machines. This record, in chart form, shows each month in minutes the total downtime of the paper machines because of mechanical and electrical failures.

After installing our preventive maintenance methods in a medium sized newsprint mill, the downtime dropped from an average of 365 minutes per month in 1948 to 209 minutes in 1949. The average monthly loss of production time through May of this year was 138 minutes, while the actual downtime in the month of May was only 84 minutes. There was also a sizable reduction in the maintenance crews during the past year.

Although much of this reduction in downtime was due directly to generally improved maintenance methods in the mill, a good percentage of the extra production time was netted from excellent preventive maintenance resulting from scheduled and conscientious inspections and lubrications, coupled with aggressive action in completing required repairs.

Calender threader in operation

. . . . saves paper

. . . . prevents accidents

▸▸▸ DESIGNED TO PREVENT calender stack accidents, the new Neely Threader has been installed and is now operating successfully on a wet calender stack in a large midwestern board mill.

While its primary purpose is to eliminate accidents, the Neely Threader* has proved to be a valuable production tool as well. Engineered and marketed by the McAfoos Sales and Engineering Co., Alton, Ill., the threader can be employed on all types of calender stacks and rolls, and on practically any grades of paper or board where accidents may occur and where excessive waste may result from manual threading operations.

The Neely Threader is a device to feed or guide, automatically, a paper strip or "tail" into and through the rolls of a calender stack. It was first announced and described in *The Paper Industry and Paper World*, January, 1948, page 1518. As now built, the unit is essentially the same as previously described, although it incorporates numerous improvements resulting from actual field tests and mill performance.

Design-Construction

Basically, the threader is made up of four main parts: (1) the universal plate, fastened to the calender frame or calender roll bearing block, upon which is mounted (2) the threading or guide mechanism that fits the circumference of the calender roll, (3) an adjustable spring tension device that holds the threader against the roll during the threading operations, and (4) a mechanism (hydraulic, pneumatic, or manual) for retracting and holding the threader away from the roll after the calender has been threaded.

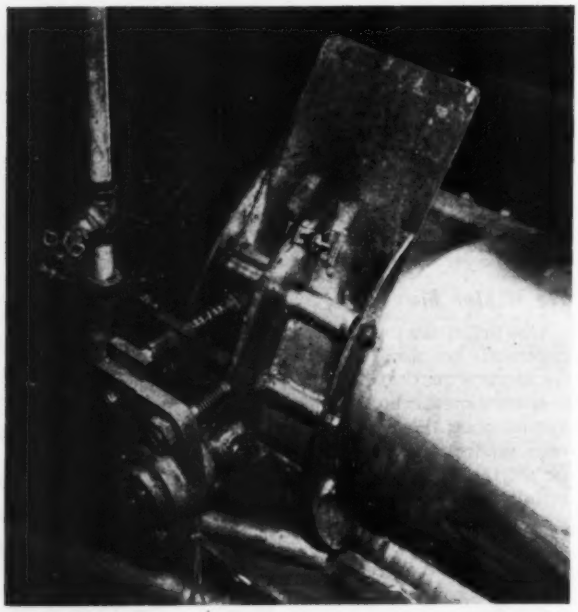
As illustrated, the top roll threader (starter threader) employs a feed lip and a single guide and pull roll. When the tail of paper from the dryers is thrust between the feed lip and the roll, it is guided into the nip between the calender roll and the threader pull roll. This pulls the paper tight and the threader guides the tail into the calender roll nip. Accidents do not occur because it is impossible for even a finger to get into the nip; the feed lip admits only a flat sheet to the nip.

Threaders for intermediate calender rolls (stripper threaders) differ from the top roll threader in that they do not use a feed lip. Instead, they are equipped with a spring loaded doctor that strips the paper from the roll above and leads it into the threader on the roll beneath. The doctor prevents the paper from sticking to the calenders and helps eliminate wrapping and plugging.

Normally, threaders are mounted on the bearing block. This provides a short hookup and keeps the unit out of the way of the operators. When the threader is designed to be operated manually, special hangers may be employed so that the unit can be positioned readily with a minimum of effort.

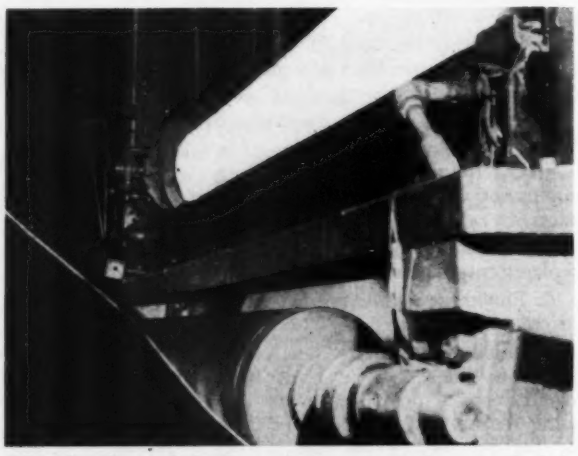
While threaders are built to fit particular size rolls, each unit is adjustable so that it may be used on rolls varying about two inches in diameter from the size for which it was designed. This permits replacement rolls of slightly different sizes to be employed without changing the threader unit.

(*) Patents pending in U.S. and Canada.



Neely Threader on top roll of wet calender stack is mounted on bearing block; feed lip is removable

Paper strip or "tail" enters feed lip and is gripped by nips between the calender roll and the threader pull roll



After threading, a hydraulic mechanism retracts the spring loaded threader and holds it away from the roll

Paper and paperboard making—VIII

HARRY WILLIAMSON

Cylinder Machine Formation Questions... Part 3

Formation Questions

Q. No. 1—How is the formation of a sheet of paper from a mixed volume of fiber and water in contact with a revolving wire mesh effected?

Q. No. 2—At what point on the revolving mold does the sheet start to form on the wire mesh?

Q. No. 3—How long does actual formation of the sheet continue to take place round the circumference of the revolving mold?

Q. No. 4—How rapidly does formation take place?

Q. No. 5—What governs the speed of formation?

Answers to Questions 1, 2 and 3 were given in the first part of this installment, published in the August issue. Answer to Question 4 was published in September.

Answer to Question No. 5

Long-Fibered Stock Forms More Rapidly Than Short-Fibered

This question as to what governs the *speed* or *time rate* of *formation* is the most important question in cylinder machine operation. We know how formation is effected and we can calculate the hydraulic force actuating the formation. We also know that the freeness or slowness of the stock from which the paper is formed has quite a lot to do with both the VOLUME of water we can use and the RATE at which this forming water is used. Included in the terms freeness and slowness, the length or shortness of the fiber is also taken into consideration. As far as drainage of water is concerned, short fiber has the same effect as hydration of fiber on the TIME RATE OF WATER DRAINAGE through the wire mesh on which the sheet is being formed. The shorter the fiber the more *compact* the immediate or INITIAL LAYER OF FIBER on the surface of the wire and the SMALLER THE INTERSTICES BETWEEN these first formed fibers for the formation water to pass through.

From the above it will be readily understood that this *compactness* of formation effect is continuous during the whole *formation time* and it can be stated that short fibered stock, from initial formation to completion of formation, will have voids between the fibers *smaller* in size than the voids between the fibers of *long* stock—both stocks beaten to the SAME DEGREE OF HYDRATION. Pertaining to the *length* of fiber only we may, therefore, state:

(a) Short fibered stock will form up *more* compactly, the TIME rate of formation is *more gradual*, the TOTAL CALIPER of the formed sheet on the mold will be *less* than a similar sheet made from longer fiber on the *same* mold at the *same* machine speed.

(b) Long fibered stock will form up *less* compactly, the time rate of formation will be *more rapid*, the TOTAL CALIPER of the formed sheet on the mold will be higher for the same ream weight than a similar sheet made from short fibered stock on the *same* mold at the *same* speed.

A practical application of this rule is seen in the use of groundwood in the form of news, a common source of supply of raw material in cylinder machine operation. Groundwood is a mechanical fiber and is much shorter (especially after it has been used to form a newsprint sheet) than the chemical fibers such as sulphite and sulphate. When we want to have less caliper for the same weight without *increasing* the beating and jordanning of the stock, we add news to the furnish. When *too* much news has been furnished in the filler stock (a fairly common occurrence on night shift when the news is closer to the breaker beater than the mixed papers or corrugated waste) blowing or crushing takes place in the mold, or the sheet drys harder. To correct this error, the tour boss orders more corrugated waste, a longer or fibered stock, in the filler furnish to OPEN UP THE SHEET.

Compactness of formation is also obtained by hydration. The length of the fiber and the hydration of the fiber are interrelated factors governing the compactness of formation and, therefore, govern, in proportion, the TIME RATE OF FORMATION.

The question of hydration and length of fiber is dealt with in detail elsewhere in the series on the subject of beating. In considering this question of "What governs the speed of formation?" it is sufficient to know that these factors affect the *rate* of water drainage; that water drainage is the means by which formation is effected, and, that when VOLUME of water used is changed by either or both of these factors then VELOCITY of the volume in use is also changed.

VOLUME of water used and the VELOCITY of the mixed volume in the approach *to* the entrace to the circle, the formation area of the cylinder mold; the turbulence and action of the mixed volume *in* the circle during the *act* of *formation* are the *key words* to remember in the operation of the cylinder type paperboard machine. VELOCITY of water passage through the wire mesh and subsequently through the

forming sheet and wire mesh is also a factor in the TIME RATE of formation.

The phrase TIME RATE OF FORMATION is stressed because it sums up concisely *everything* which can be done; either on the machine by adjustment, or in the stock preparation in the beater room, to *control* or *govern* the speed of formation. Adjustment of differential of water levels, shortening the stock, hydration of the stock, adding longer fiber to open up the formation, *all* register their *effect* in the *time rate of formation.* This is true regardless of the type of paper machine in operation. In the operation of a cylinder type machine with multiple cylinder molds in operation it is *most* important to understand the meaning of this rule. Here we are forming *several individual sheets;* form different types of furnish simultaneously and laminating them together successively to produce a continuous sheet of board. If the formation effected on one or two of the molds is widely different in *compactness* or *evenness* from the formation effected on the rest of the molds then operating trouble is experienced or the final sheet is off quality in one or other of the required specifications.

We may, therefore, formulate an all embracive statement and say: "The speed of formation is governed by *any operating factor* which causes a change in *volume* of water used *or velocity* of water *in use.*

These factors may be divided into two brackets: (1) The mechanical arrangement of the complete vat-cylinder mold unit, and (2) the type of fiber used and the preparation of the fiber to form the sheet. In our discussion of the mechanical arrangements we can be *completely and positively factual.* Engineering and hydraulic data expressed in per cent proportions of the mixed volume used, square feet of formation area and formation weight of board per minute can be definitely stated. The mechanical means of control provided and the operation of these mechanical means also may be discussed in definite terms. In our discussion of the second bracket the slowness or freeness of the stock used; the *rate* at which the forming sheet will part with the water media of formation may also be definitely expressed in *seconds* per *gram* weight of formed paper. However, there *still remains* one very important factor we are unable to express either as a unit of *time* or as an *amount* of *force* movement actuating as resistance or acceleration to the drainage of water while the fibers are being formed into a continuous sheet of paper. That factor may be described as "the cohesive tenacity of the fibers to cling to each other and to the surface of the revolving wire mesh in proportion to the development of the COLLOIDAL JELL OF HYDRATION.

We *know* that unhydrated fibers, brash, harsh fibers which have *not* been beaten at all, particularly the unbeaten sulphate pulp made from fast growing pine, will *not* form into a sheet of anything like EVEN CONTINUITY on the wire mesh of a *revolving* mold. Such stock picks up in lumps and patches. We *know* that free stock (particularly beaten stock) will SLIP and SLIDE over the surface of the formation area of a revolving mold. The *amount* and *direction* of *slip* of free stock fibers is unpredictable or within the MECHANICAL means of control; it is variable with the length of the fibers and the VELOCITY of flow THROUGH the wire mesh. In the early stages of formation there is a constant SHIFTING of the individual fibers exposing or closing small areas of relatively bare wire mesh. Each exposed area increases the RUSH of water to that particular point; eddies and currents of variable velocity and directional changes are created and the *net* result is a LUMPY, uneven and LOOSELY packed formation. The resultant sheet is bulky and RAGGY, the ream weight in pounds per point of caliper is *low.* (See Ream Weight Density Table, p. 392, July, 1950).

Fortunately we *know* how to arrange the *formulae* and *beating* of the stock to offset this formation variable; if we didn't then the beautiful sheets of board used for high class printing advertisement could not be made directly on the cylinder type machine. We know *how* to get excellent formation by stock treatment. We have accurate units of freeness measure to *continuously* and consistently prepare the stock to the degree of hydration necessary to produce board of *uniform* formation and to the required ream weight density per point of caliper, but we *can not equate the value* of the tenacious cohesiveness of the colloidal jell of hydration in mathematical terms. In our discussion of this very important formation factor we must still express ourselves in terms of opinion.

When this factor can be POSITIVELY EQUATED the MOST REVOLUTIONARY CHANGE IN THE DESIGN OF THE FORMATION AREA OF THE PAPER MACHINE WILL TAKE PLACE.

Volume and proportion

Before discussing the distance and position of the arc of the circle to the arc of the revolving cylinder mold it is very necessary for the reader to truly visualize the tremendous volumes of water we have to use in proportion to fiber to make a sheet of paper. It is easy enough to set down a rule and say "we must *obtain* and *maintain* complete and *even dispersion* of the fibers in the liquid volume," but like a lot of other things in life it is much easier to talk or write about than it is to DO IT. The cylinder type machine has been in operation well over 100 years and the most *radical* change in vat design has taken place, in commercial operation, since 1934. Even this change, the advent of the overflow type vat, *still* retains the circle, *still depends* on static head or differential in water levels as the effective force to cause formation to occur; the changes in design are primarily to *increase* volume, to obtain *dispersion* without the use of compartments or baffle boards which are notorious dirt and slime collectors, and to more accurately control VELOCITY, DISPERSION VOLUME and VELOCITY *in relation to formation* on the cylinder type machine are much easier to define than to accomplish twenty-four hours per day on a demand of wide range of caliper, ream weight density and specifications ranging from extreme rigidity to folding and creasing over a 90 degree angle.

A few years ago (1943) this writer bought a small paper mill for a client and personally started up the one-cylinder type machine. Originally, the vat had been built in 1852 and had not been changed in design at all. This tiny machine operated on bogus wrapper

at a production rate of only 500 lb. to 600 lb. per hour according to ream weight wanted. In *proportion* to the *hourly production* this old-fashioned vat operated just as *efficiently* as the most modern vat of the counterflow design. In other words the vat could handle and permit operational CONTROL of the VOLUME used and VELOCITY rate of use necessary for the required production. In this progressive mechanical age production demands rapidly increase and in the operations of the cylinder machine the vat has simply grown larger and larger to accommodate the volumes required; the *basic* design *has not changed* until the partial change to the overflow type. At the moment of writing, the maximum speed obtained on the most modern cylinder type machine has *not* reached 600 fpm as compared to 1400 fpm as standard commercial operation for the fourdrinier type machine. During March, 1950, a cylinder type machine was started up in Sweden and the builders and buyers of this machine express the *hope* that this machine will run at a speed of 650 fpm in commercial operation. This author has not the slightest doubt of the engineering values embodied in any cylinder type machine built during the past 18 years to *run* at speeds in *excess* of 1500 fpm; the problem is to *form a sheet of paper at that speed.* For the past thirty years we have been constantly increasing the *beating* of the fibers simply to meet the mechanical requirements of the existing design of *formation* area of any type machine. There is a limit to how much beating fibers will stand until they *lose* the natural characteristics necessary to the usage of paper.

The present design of the fourdrinier machine has nearly reached this limit for papers other than tissues. Beyond 2000 fpm, a *radical* change in this design will be necessary. The design of the most modern cylinder type machine is way behind the fourdrinier in relation to running speed. In both types it is *not* a question of removal of surplus liquid water either by the use of suction rolls, suction boxes or mechanical roll pressure; modern engineering has already solved all these problems for application *after the paper is formed.* It is not a question of drying the formed sheet of paper or paperboard. Again modern engineering has solved these problems regardless of the climate of the location in which the paper is made. It is the problem of FORMATION without having to destroy the fibers by BEATING.

In comparing the speeds reached by fourdrinier operation and those reached by revolving cylinder mold operation we must bear constantly in mind the TWO BASIC DIFFERENCES in design of the formation area, the wire mesh on which the paper is formed. The fourdrinier design is a single wire traveling on a horizontal plane. Here the law of *gravity* is an *aid* to formation because the fibers are *laid* on *top* of a traveling surface. The VOLUME and VELOCITY of volume of the formation water used need *only* to be controlled to effect formation; the forming sheet *can not fall off* the surface on which it has been formed. The revolving cylinder mold on which the fibers are formed is rotating in a cycle and formation takes place as an INTERCEPTION of the CYCLIC ROTATION. Here the laws of gravity and centrifugal force are both in effect *against* the *retention* of the forming sheet on the surface on which it is being formed, the sheet can fall off. The formation water has to perform the added duty of holding the forming sheet onto the surface of the revolving wire mesh.

As we have noted, the intangible factor of the tenacious clinging capillary force of the hydration developed on the fibers by *beating*, we again point out that raw unbeaten stock will *not* form up in a continuous sheet *at all* on a revolving mold, here we have an indirect measure of the value or holding force of the tenacity of developed hydration. Because the cylinder machine has multiple molds and, therefore, multiple units of formation wire mesh as compared with the SINGLE UNIT of the fourdrinier machine it is capable of producing paper board at a high tonnage rate per hour but the wet end, the formation area, can not be run at speeds comparable to the fourdrinier machine until a *radical* change in design removes the disadvantageous application of the laws of gravity and centrifugal force.

Both these forces can be arranged to be *advantageous* to formation. When this is done cylinder machine operation will move rapidly forward in speed and production. In the meantime the immediate goal in speed is 650 fpm for the cylinder machine as compared to 2000 fpm as the immediate goal of the fourdrinier machine.

As an example of the total volume and proportions of fiber to water at the various stages of operation at the wet end of the machine we will examine the requirements of a modern counterflow board machine designed to produce 10 tons per hour of high grade folding boxboard. This machine, started up in 1948, is equipped with eight 60-inch diameter cylinder molds of the counterflow type, that is the mixed volume flows into the circle *against* the rotation of the cylinder mold. The face width of each cylinder mold is 140 inches and the machine produces a finished trim of 128 inches of board. All calculations are based on the finished trim of commercial board.

As a specific example we will discuss the manufacture of a 0.016 point caliper patent white folding boxboard with a formation density of 10-lb. ream weight per 0.001 point of caliper making the ream weight of 3000 square feet to weigh 160 pounds. This formation density is representative of high grade board; the total number of points caliper is relatively a light weight sheet for board, therefore, to make ten tons per hour the machine will have to run at top speed. By using this sheet as an example the reader will have the *greatest* number of gallons; VOLUME, and the fastest machine speed; VELOCITY, now used on a modern counterflow type cylinder board machine.

To produce 10 tons per hour, the machine 128 inches trim, will have to run at a speed of 585 fpm.

Sixty-inch diameter molds equal 3.1416 x 5 ft. equals 15 feet in circumference. The cylinder molds will be revolving at the rate of 38 rpm.

Ten tons per hour divided between eight molds equals 1.25 tons per hour or 2500 pounds per hour per mold. Each mold will have to *form* 41.66 pounds of paper per minute. Reduced to a study of *one* mold then we can state the total gallons per minute and

the percentage of gallons formation water to gallons of *forming* fiber on a cylinder mold 60 inches in diameter revolving at 39 rpm.

The stock pumped at 3 per cent consistency in the required amount of 41.66 pounds per minute represents a volume of 166.7 gpm. The fan pump which handles the return water from the *inside* of the cylinder mold delivers water at the rate of 1073 gpm to mix with the stock volume prior to entering the screen. This total volume of 1239.7 gpm enters the screening process with a fiber consistency of 0.4 per cent.

Leaving the screen the mixed volume enters the head box by gravity flow and at this point a further addition of return water delivered by the fan pump of approximately 363 gpm is made, bringing the total mixed volume in the head box, ready for delivery to the vat, to 1602.7 gpm. Of this total volume the fiber content is still only 41.56 lb. per minute, or five gallons of fiber, making the consistency at this point 0.31 per cent.

This total mixed volume is then delivered by gravity flow to the receiving and dispersion compartments of the vat. Entering the circle, the formation area, at this consistency of 0.31 per cent formation will commence, the wire mesh will begin to pick up fiber, as soon as a differential in water levels is created and the pressure of the static head goes into effect. The cycle is then complete. The sheet is being formed and couched off the wire mesh continuously with *each revolution* of the mold the water of formation is passing *through* the wire mesh continuously in the *act* of formation to the *inside* of the mold; and this water of formation is being taken away from the inside of the mold to be returned under separate valve control, to the screen and head box to again become the medium of transportation and formation for the next minute's supply of 41.66 pounds of papermaking fiber.

The newly formed sheet as it is couched off the wire surface onto the felt by the pressure of the revolving couch roll is at a consistency of approximately 10 per cent fiber and 90 per cent water. The total *volume* of wet paper equal to finished paper of 41.66 pounds is 50 gpm; the balance of this surplus water is removed by suction rolls and weighted press rolls leaving a moisture content in the finished board after drying of from 60 to 80 per cent by weight of finished board.

In addition to the water mixed with the stock at the various points of the wet end system which we refer to as the mixed volume we also have the pressure water from the shower which is arranged to continuously shower the revolving wire mesh immediately after the sheet has been couched off each revolution. This shower water passes through the wire mesh *before* formation commences on the cleaned wire each revolution and of course becomes part of the gallonage handled by the fan pump. The volume of this water on a mold of this size is approximately 100 gpm. This shower water, therefore, becomes a part of the operating cycle continuously but is not formation water until it has performed the duty of cleaning the wire mesh.

In operation the machine tender uses dams or spillways for the FINE ADJUSTMENT of the differential in water levels between the outside and inside of the cylinder mold. The volume of water passing over these spillways is approximately 216 gpm and, of course, this volume is *lost* from the *immediate* operating cycle being returned to the general white water system via the saveall.

The VOLUMES and percentage of fiber to formation water, tabulated and columnized, to produce 41.66 pounds of paper per minute from the operation of one cylinder mold will give the reader a clear conception of the TREMENDOUS VOLUMES required to operate *eight* cylinder molds simultaneously on one cylinder type board machine.

Realizing this, the problem of *maintaining the fiber in dispersion* until the INITIAL formation and continuance in even dispersion throughout the *range* of TIME RATE of formation assumes more significant proportions. Casual reading of these figures will, this writer hopes, be sufficiently informative to interest a deeper investigative curiosity. A quiet evening with pencil and paper, setting up your own diameter mold, ream weight, density, and machine speed will bring the reader much closer to the heart of the BASIC PROBLEMS of the operation of the cylinder type board machine; CONTROL of the VOLUME and VELOCITY of the total volume required.

Until we can utilize the laws of GRAVITY and CENTRIFUGAL FORCE to our operational ADVANTAGE instead of the adverse application as presently used in the operation of a revolving cylinder mold as the FORMATION UNIT, the linear foot SPEED of the cylinder type machine is DEFINITELY LIMITED TO THE AMOUNT OF TENACIOUS CLINGING COHESIVE FORCE of the fibers created by the hydration or development of the colloidal jell which, for want of a better name, we call hydration. In turn, the degree of hydration developed is limited to the degree where further development of this colloidal jell will result in the destruction of the characteristics required in the finished sheet of paper; each type of fiber *inherently* defines the limiting degree by the conditions of its own growth.

The table "Volumes and Percentage Water and Fiber," is fully representative of the operation of one cylinder mold on a counterflow type vat. As the consistency changes the percentage will change. As the freeness or slowness of the stock is changed the total volume will be changed; the more free the stock the greater the total volume used. Consistency range from 0.1 per cent fiber for tissue papers to 1.2 per cent fiber for 0.035 caliper board.

Volumes and percentage water and fiber, making 41.66 lb. of paper per min. on 60-inch diameter mold

Position	Fiber		Water		Total GPM
	GPM	% total vol.	GPM	% total vol.	
Stock supply	5	3	161.7	97	166.7
Screening	5	0.4	1234.7	99.60	1239.7
Head Box	5	0.31	1597.7	99.69	1602.7
Entering Circle	5	0.31	1597.7	99.69	1602.7
Formed Paper Couched from Cylinder Mold	5	10	45.0	90	50
Formation Water to Inside Mold			1552.7		
Shower Water to Inside Mold			100.0	100	1652.7
Formation water to fan pump, continuous cycle					1436
Regulation water to spillways, regulation of inside level					216.7

How safety became a habit at Marinette

Plant Manager Sears (left) and Howard Gillman pose with "Junior" Scott, a permanent reminder not to "monkey with your safety." The shield, "Think, Work, Talk Safety" is displayed throughout Marinette Paper Co. mills

GEORGE CLOSSAY, JR.
Safety Engineer, Marinette Paper Co.*
(South Glens Falls, N.Y).

▶▶▶ SAFETY ACHIEVEMENT is not won quickly; it must be worked for continuously. With this lesson learned, the employees of the Marinette Paper Co.'s South Glens Falls (N.Y.) plant *have made safety a habit.*

On May 1, 1950, our 140 production workers completed 1000 days of work, a total of 828,000 man-hours, without a single lost-time accident. The last lost-time accident at our plant was on July 27, 1947—and it was the only accident that year.

(*) The Marinette Paper Co. is a subsidiary of Scott Paper Co., Chester, Pa.

A comparison of our frequency rate of 36.02 (almost twice the national average) for 1946 with a rate of zero for the past two calendar years is proof that our work has been successful.

During the period when team work was developed for this safety success, other phases of our business also have profited; efficiencies have increased substantially; and meritorious awards for shipping excellence have been earned along with many safety awards.

This safety record of 1000 accident-free days is one of our major contributions to Scott Paper Co.'s "70 years of progress through quality" celebration. Our record has provided a good example for seven other mills giving them a realistic goal to aim at in their own safety programs. However, we have taken these honors in stride and there is no sign of tension among our associates despite the fact that they have been held up as a good example. They are accepting safety consciousness as an integral part of their work day.

The South Glens Falls plant is a 30-ton mill engaged in the production of Soft-Weve toilet tissue and Scott Windshield Wiping tissue. Since it was not a new mill when acquired, one of the first tasks was to impress every worker with the importance of good housekeeping and maintenance. By elimination of fire hazards, instituting daily fire protection equipment inspections, and constant campaigning, the plant was made safe against fires as well as accidents. Also the employees were constantly impressed

Planning a second thousand days of safety for Marinette Paper Co.'s South Glens Falls mill: L to R—Charles A. McGinnis, Employers Mutuals safety engineer; R. H. Sears, plant manager; George Clossay, Jr., Marinette safety manager; and Howard Gillman, chairman Employees' Safety Committee

Trophies won by the Marinette mill in two years without accidents are displayed by George Clossay, Jr. Included are plaques from the National Safety Council, Scott Paper Co., Associated Industries of New York, and Employers Mutuals of Wausau (Wis.)

	National Safety Council		Glens Falls		Fort Edward	
	Freq.	Sev.	Freq.	Sev.	Freq.	Sev.
1943	17.13	1.30	53.12	6.87	—	—
1944	17.50	1.28	12.62	.26	—	—
1945	17.14	1.05	17.07	.44	—	—
1946	19.90	.84	36.02	.70	48.2	.89
1947	13.82	1.45	3.62	.02	15.50	.39
1948	13.16	1.92	0	0	5.15	.26
1949*			0	0	5.54	.09

(*) To be published later

with the danger of fire and what it would mean to their jobs.

Successful safety at South Glens Falls has been made possible by the fine cooperation between management and employees. "Success in safety is important," says Plant Manager R. H. Sears; "It has only one yard stick—*a reduction in human suffering.*" Whatever the by-products of running a safe plant may be, Raymond C. Mateer, executive vice president, and J. L. Ober, vice president in charge of production of Scott Paper Co. insist that management assume its moral responsibility for safety.

An invaluable aid to our safety program has been the outstanding job of Charles A. McGinnis, safety engineer of Employers Mutuals Liability Insurance Co. of Wisconsin, our insurance carrier. It's easier somehow for someone else to come into your living room and see that the lamp shade is tilted. Mr. McGinnis is as free to come and go through the South Glens Falls and Fort Edward mills as our own people. In addition to these plant inspections, he also attends our safety meetings, and can always be counted on for helpful ideas and suggestions.

Safety gets a big boost in all Scott plants in the "How're We Doing?" talk by General Manager of Paper Mills Harrison F. Dunning each year. Mr. Dunning presents this unique report to each mill giving all employees the facts and figures on Scott operations for the preceding year.

At a banquet for all South Glens Falls employees celebrating the second calendar year of perfect safety, Vice President J. L. Ober presented on behalf of the company's board of directors, a handsomely framed resolution commending the entire personnel for "outstanding achievement—an accomplishment of conspicuous excellence for which each person is deserving of the highest praise and commendation for having set an exceptionally noteworthy example." By such means as these, top management shows its cognizance of and interest in our accomplishments.

How do we do it? *We make safety important.* We don't believe there is anybody in our plant from Howard Gillman, electrician, who heads the safety committee, to the newest employee who isn't fully conscious of the need for working safely—not only for his own protection but also for the safety of those who work with him.

The Employees' Safety Committee is made of eighteen production workers selected by the safety committee, with the advice and guidance of the department superintendent. The committee serves for one year. Membership is rotated so that most of the production workers will have the advantage of this safety experience. Meetings are held the third Thursday of each month at 2:00 p.m. and are attended by the plant manager, and as many department heads and foreman as are able to be present. Each member of the committee is called on individually for his suggestions or comments.

Supervisors take notes on matters discussed and complete recommendations before committee meeting minutes are published frequently. The supervisors take pride in beating us to the punch in this way. Any recommendation of the safety committee is given top priority by Ralph G. Young, Jr., plant engineer.

Safety consciousness has been kept alive at South Glens Falls by "Junior Scott." Junior is a tame midget babboon and is the second anthropoid to grace the halls of Scott's mills. Both came to the company as the result of an idea of General Manager Dunning. He purchased a monkey named "Prudence Scott" to keep the home plant workers at the Chester, Pa., mill aware of the injunction, "Don't Monkey With Your Safety." Prudence made such a hit that Junior was acquired to make a tour of all eight Scott plants dramatizing the importance of the accident prevention program.

Specific indication of what has been accomplished in a thousand days of safety is shown by a comparison of South Glens Falls frequency and severity figures for the past seven years compared with the National Safety Council figures for the tissue mills. We also include the figures for the nearby Fort Edward mill for the years it has been operated by the Marinette Paper Co.

Great Northern

▶▶▶ AT AN OLD PORTAGE point known as "Spencer's Carry," Ambajejus Lake and Millinocket Lake are separated by less than 200 yards. While the difference in level is only about ten feet, it was enough to prevent the water of Millinocket Lake from being utilized by the company's hydroelectric plants which rely on water from Ambajejus Lake and other connected lakes on the west branch of the Penobscot River. To overcome the threat of a power shortage brought on by several years of drought, a pumping station was built last fall at Spencer's Carry to transfer water from Millinocket Lake to Ambajejus Lake. This additional water helps supply the North Twin and Millinocket power plants under a total combined head of about 140 feet. Thus, Millinocket Lake water has been made available with a net head of about 130 feet. By utilizing the basins of both lakes in this manner, the output of the North Twin and Millinocket power plants has been increased by about 2,000 hp., or approximately 13,000,000 kw-hr. per year.

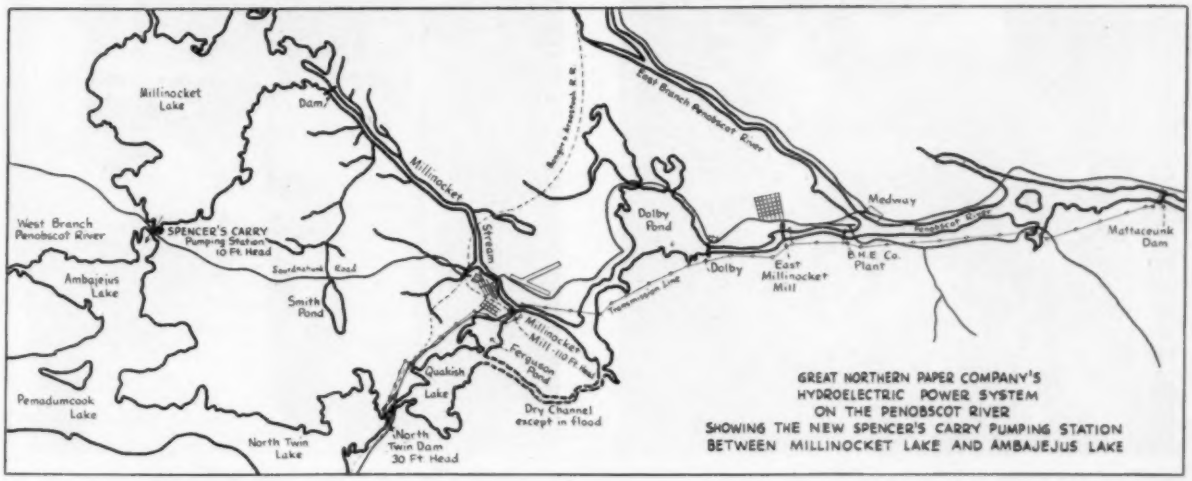
Five hydro plants on the Penobscot

As shown on the map, the Great Northern mills at Millinocket and East Millinocket have hydro-power developments at North Twin, Millinocket, Dolby, East Millinocket, and Mattaceunk, all on the Penobscot River. Even with the aid of several storage reservoirs upstream on the west branch of the Penobscot River, the threat of a power shortage due to insufficient water made it desirable for Great Northern to find a way to utilize the water in Millinocket Lake. Because of the time required to construct a complete hydroelectric development, other methods were sought. In studying the problem, Great Northern engineers hit upon the idea of pumping water from Millinocket Lake over the hump known as Spencer's Carry to Ambajejus Lake so that it could be utilized in the existing power plants.

The 45,000 gpm pumping station, designed and engineered by the Great Northern Paper Co.'s engineering department, was constructed by A. P. Wyman Co., Inc., Waterville, Me. It consists of two separate but duplicate systems, each with a single-stage axial flow propeller-type vertical pump driven by a 310 hp. Diesel engine. Discharge from each pump carries through a 54-inch steel pipe line about 550 feet long, which connects the two lakes. Pumping equipment, including the Diesel engines, was supplied by the Ingersoll-Rand Co.

Engineers planned the project so that it would not interfere with either lake's fishing or various camp sites which exist on the shore lines.

Paper Co. increases hydro-power output



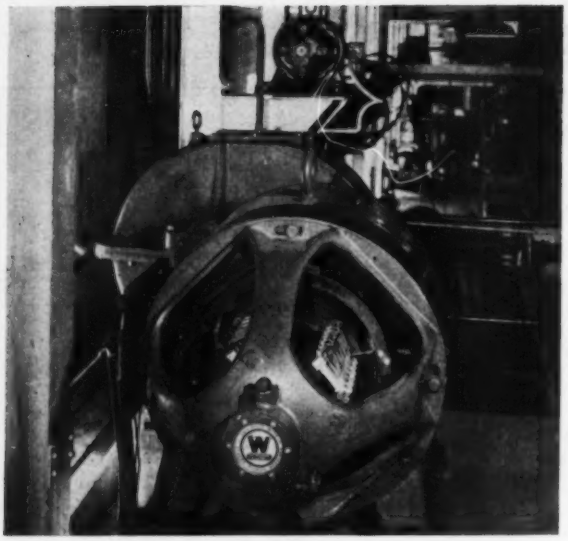
Spencer's Carry pumping station permits use of Millinocket Lake water in the North Twin and Millinocket hydro power plants with a combined head of 140 ft.

BEFORE—Pumping station being constructed on Millinocket Lake; two 560-ft. long, 54-inch diam. steel pipe lines cross Spencer's Carry.

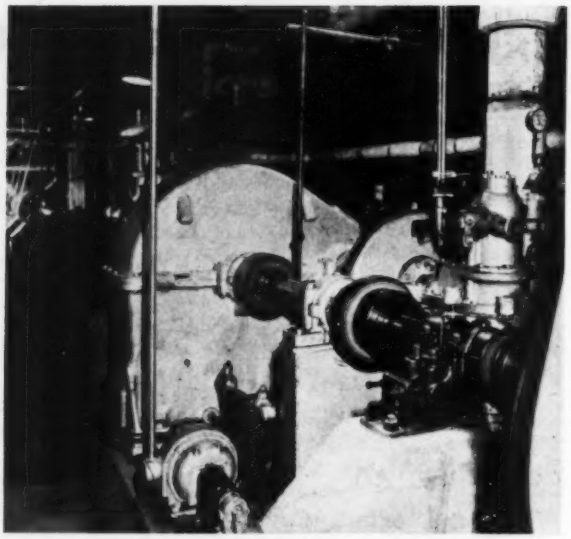
AFTER—Complete with landscaping, pumping station contains two pumping units and auxiliary equipment.

One of the two pumping units; vertical, single-stage, axial flow Ingersoll-Rand pump is driven by Diesel engine.

45,000 gpm are discharged into Ambajejus Lake, adding 13 million kw-hr. annually to the power output.



Electric motors geared to wall-mounted lineshaft



Steam turbine coupled to paper machine lineshaft

Motors vs. turbines for line shaft drives

R. R. BAKER
Industrial Engineer
Westinghouse Electric Corp.

▶▶▶ IN PAPER MILLS where the operating conditions justify the selection of lineshaft mechanical drive, it is necessary to determine the type of prime mover to be specified to secure the most economic performance. Under these circumstances there are two general classes of lineshaft drive which should be considered:

1) adjustable-speed turbine
2) single-motor electrical

The paper machine drive requires essentially constant torque over the operating speed range; therefore, the power requirements vary directly with the operating speeds. On the other hand, the machine production as well as the process steam requirements for paper drying remain essentially constant over the speed range. Operating under these load conditions, the operating efficiency of either type of drive will vary materially over the operating speed range. Furthermore, the over-all heat balance of the mill will vary with regard to both the operating speed of the paper machine and the type of drive selected for the lineshaft.

It is estimated that in paper mill operations, steam and power costs represent from 10 to 20 per cent of the cost of the finished product. Efficient production requires these costs to be held to a minimum. Most mills are unable to generate their full power requirements from the process steam; consequently it is necessary for these plants to operate with some power generated on condensing units. These results are accomplished with the modern bleeder type turbine unit. Sufficent steam is bled from the turbine to meet the requirements. As the steam expands from boiler pressure to the pressure required by the process, available energy is extracted and only sufficient steam is passed to the condenser to balance the plant electrical load. Under such operating conditions, it is desirable to obtain maximum power from all process steam to reduce the amount of steam which must be passed to the condenser.

Adjustable-speed turbine drive

The adjustable-speed turbine drive consists essentially of a high-speed geared turbine of the required capacity to drive the machine over the required operating speed range selected to meet the existing steam conditions and ordinarily arranged to exhaust into the paper machine dryer steam header. Such a unit may be belted or coupled to the machine lineshaft. Since the operating speed of the machine must be stable and accurately maintained over the entire operating range, turbines designed for this service must be provided with governors which are: *extremely sensitive* to insure a high degree of accuracy; *highly* responsive, to avoid excessive variations during transient conditions; *effectively damped,* to insure stability, and to avoid speed disturbances which would interfere with the operation of the forming end of the machine when clutching in the heavier sections on the drying end. In addition, the turbine should be nozzled for a peak load capacity possibly 25 per cent in excess of the normal running load.

Although the adjustable-speed turbine drive has the advantage of direct conversion from the high-pressure steam to lineshaft motive power, thus eliminating electrical conversion losses, it is subject to somewhat lower operating efficiency because:

(a) it is generally a smaller unit than a power-house generating unit

(b) it may be frequently operated at reduced speeds within the operating speed range

(c) there are throttling losses which result from nozzling the adjustable speed turbin for peak load.

Adjustable-speed electric drive

The single-motor, adjustable-speed paper machine lineshaft drive consists essentially of a direct-current motor, which may be coupled, geared or belted

to the paper machine lineshaft; a motor-generator set, to convert alternating to direct current for the lineshaft motor; complete automatic control, with an operator's control station arranged for convenient location on the machine room floor; and speed-regulating equipment, designed to provide close speed regulation and stable operation over the entire speed range.

With single-motor electric drive, the plant power house is laid out to provide both power and process steam to the paper machine, whereas with the adjustable-speed turbine drive, the plant power house is relieved of both the electrical and process steam load, and high-pressure steam is supplied from the boiler room directly to the turbine driving the paper machine.

Pros and cons

The relative performance of the two types of lineshaft drives under consideration will depend upon the actual mill operating conditions which will vary with steam conditions, the yearly production schedule in terms of maximum operating speed, the relative size of the power house and the adjustable-speed turbine unit with the throttling losses resulting from nozzling the turbine for paper machine peak loads, as well as with the type of turbine under consideration for the adjustable-speed drive.

As an example, consider the relative performance of the two types of drives under typical plant operating conditions, as follows:

(a) Steam—500 psi gauge, 725 F. total temperature, 2 in. hg absolute condenser pressure and 50 psi gauge process steam pressure for drying.

(b) Paper Machine—240 in. fourdrinier designed for producing a kraft sheet over a speed range of 1350 to 135 fpm, having a production rate over the dryers of 500 tons per 24 hours, requiring 100,000 lb. of steam per hour for paper drying, and an input to the machine lineshaft of 1100 hp. at the maximum operating speed. For the purpose of the analysis it has been assumed in connection with the machine operation that the driving torque and production rate will remain constant over the operating speed range of the machine.

(c) Power House Turbine Generators—A plant of 500-ton capacity will require approximatley 15,000 kw.; for the purpose of this analysis the relative performance of the two types of drives is based on a 7500-kw. capacity condensing bleeder turbine supplying both power to the mill bus and process steam at 50 lb. pressure for paper drying, as compared with a 1100-hp. paper machine drive unit.

(d) In this example, a 1100-hp. multistage turbine is considered, and it is assumed that no throttling losses will be encountered due to peak load nozzling of the adjustable-speed turbine.

To make the analysis on this typical example, a set of performance curves have been prepared. These curves include:

(a) The combined efficiency of electrical conversion including a-c generator, d-c generator and d-c motor efficiencies over the operating speed range.

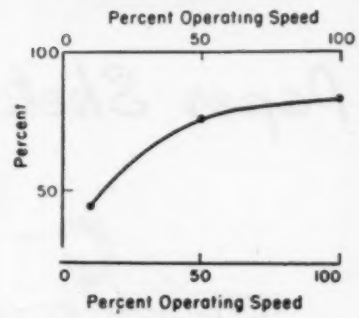
(b) Steam flow required by the adjustable-speed turbine when developing constant torque over the operating speed range.

(c) A composite set of curves indicating the operating load for the adjustable-speed turbine, the operating load of the single-motor electric drive and the equivalent power to be obtained from the power house unit when passing the full quantity of steam required by the adjustable-speed turbine unit from the high-pressure end to the bleed point, all expressed in terms of the maximum load requirement of the adjustable-speed turbine and plotted over the operating speed range.

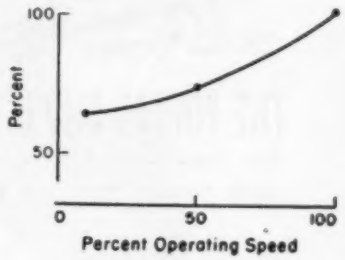
(d) A curve representing the reduction in load on the condensing end of the power-house generator resulting from the use of a single-motor drive as compared with an adjustable-speed drive over the operating range.

In the particular example chosen for this analysis it will be noted that the adjustable-speed turbine drive is at a disadvantage over the lower portion of the operating speed range. This is due to the critical effect of the operating speed on the adjustable-speed turbine efficiency. From 10 per cent minimum operating speed to approximately 85 per cent operating speed, the single motor drive indicates a reduction in steam flow to the condenser. From 85 to 100 per cent operating speed, the adjustable-speed turbine shows an advantage over the single-motor drive. Although the operating performance as set forth is typical of many mills, the analysis covers only an assumed set of operating conditions. Each individual case must be studied under actual prevailing conditions and the operating requirements and equipment cost definitely ascertained. Although considerations other than the relative operating economies frequently serve to justify capital expenditures, a careful analysis of each particular case should be made before a selection is decided upon for the type of prime mover to be applied to the paper machine adjustable-speed lineshaft.

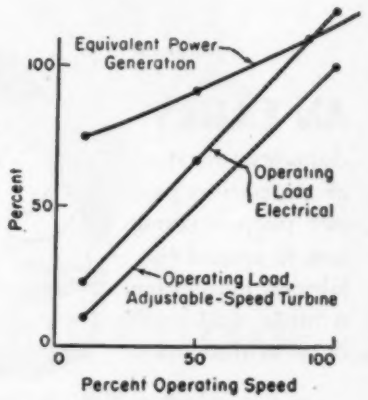
Performance curves



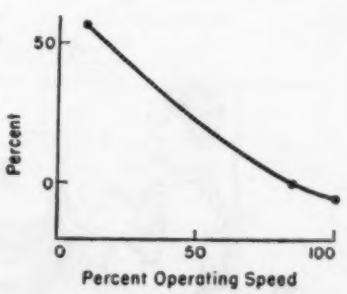
Combined Electrical Efficiency (Percent)



Steam Flow, Adjustable-Speed Turbine (Percent Maximum)



Operating Loads and Equivalent Power Generation (Percent Maximum, Adjustable-Speed Turbine)

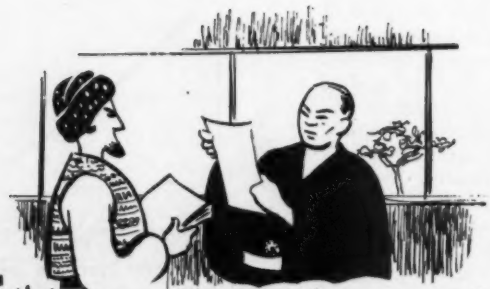


Reduction in Load on Main Power House Generation (Percent Maximum Horsepower)

Paper Sketches.....

THE POPLAR AND ASPEN logs used to produce pulpwood for America's first soda pulp process mill were barked by draw knives in wood yards.

AN EARLY Japanese method of preparing paper pulp, it seems, was to spread the fibrous material on a table and beat it with mallets.



Toilet paper was reported being used in China during the Ninth Century.

112 pounds of paper can be made from the pulp of a single tree 18 to 20 years old.

THE BAGLEY & SEWALL CUTTER . . . SIMPLEX, DUPLEX, and TRIPLEX DESIGNS

This new Bagley and Sewall Cutter, besides being a sturdy, smooth running machine, has many innovations. It's definitely new design — a cutter that does a clean cutting job easily with a minimum of attention. Has a quick-change dual slitter that makes easy changing from one set of slitters to another without breaking the sheet.

Has positive drive on knives and draw rolls, assuring accurate sheet lengths. Knives are easily adjusted — no shims. All clutches are air-operated from the front of the machine, and all driving parts are totally enclosed for safe operation . . . to mention a few desirable features.

This new cutter can be furnished in simplex, duplex, or triplex design.

If you want clean, accurate cutting, then the Bagley and Sewall Cutter is the machine for you. Write us for more detailed information.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

WATERTOWN, NEW YORK

Finland Representative
Aktiebolaget Ekstroms Maskinaffar
Helsingfors, Finland

Foreign Representative
Castle and Overton, Inc.
630 Fifth Ave., Rockefeller Center, New York, N. Y.

New York Office: 500 Fifth Avenue, New York, N. Y.

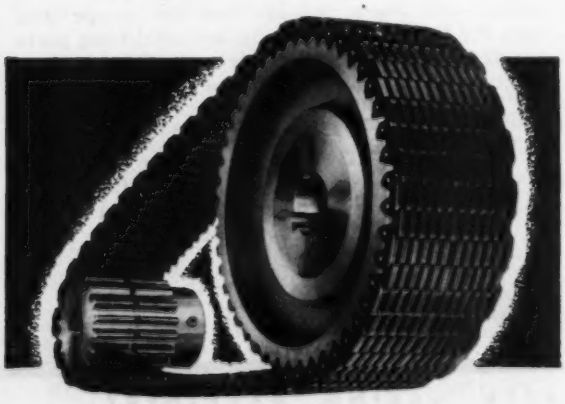
ALWAYS A GOOD FIRST STEP

to Sound Power Transmission . . . WHITNEY CHAIN DRIVES AND FIELD SERVICE

As a builder or user of paper machinery, you can take a long step towards reducing your power transmission costs by standardizing on Whitney Silent Chain Drives.

That's been the experience of many leading paper machinery designers and manufacturers. And they've learned that these outstanding drives contribute to product reputation through real service performance.

Here's why . . . deeply seated in sprocket teeth Whitney Chains transmit full-rated horsepower without friction or slippage. This gives you constant machine output . . . highest transmission efficiency. Their versatility and adaptability simplifies design. They operate on short or long centers, drive shafts clockwise or counter-clockwise, separately or simultaneously. In addition, Whitney's 50 years of specializing in the building of quality chain drives, guarantees the utmost in drive life with minimum maintenance.



PLUS WHITNEY SERVICE—And remember, Whitney Chain Drives . . . roller, silent, conveying chains, and cut-tooth sprockets . . . are carried in stock by a nation-wide network of more than 130 Whitney distributors. This fast local service saves you time, assures prompt delivery of your chain drive requirements . . . means that you are served more readily. In addition, 15 Whitney field offices, strategically located throughout the country, are at your service to help you solve your power transmission problems. For specialized chain engineering assistance consult your nearest Whitney field offices or write for catalog:

WHITNEY *Chain Drives*

WHITNEY CHAIN COMPANY

236 HAMILTON STREET, HARTFORD 2, CONNECTICUT

Series of papers on wood chemistry headlines Cellulose Division of A.C.S.

Reported by LOUIS E. WISE

▶▶▶ AMONG THE MANY symposia which characterized the 118th National Meeting of the American Chemical Society held during the week of September 3-8, an especially interesting one was sponsored by the Division of the Cellulose Chemistry. Under the leadership of Dr. F. E. Brauns of the Institute of Paper Chemistry, a series of papers were presented dealing largely with *Wood Chemistry*. The meetings were held in the student lounge at Roosevelt College, in Chicago.

On the afternoon of September 4, after a welcoming talk by Dr. Brauns, the session opened with a paper on the *Chemical composition of eight tropical woods, as indicated by proximate analysis*, presented by L. E. Wise, R. C. Rittenhouse, and C. Garcia. The work had been carried out at the Institute of Paper Chemistry in co-operation with the Office of Naval Research and the Yale University School of Forestry. Following this came a highly significant technical paper on *Structural aspects of the color reactions of lignin with phenols* by John C. Pew, of the Forest Products Laboratory. His data throw an interesting light on the possible structure of a portion of the lignin molecule as indicated by the absorption spectra of colored model substances and of various lignin preparations treated with resorcinol.

A. C. Shaw, of the Ontario Research Foundation, reported on an analysis of the *essential oil obtained from hemlock (Tsuga canadensis)*, and a very interesting article on the constituents of the *extractives from Ponderosa pine bark* was presented by Drs. Hubbard and Kurth, of Oregon State College, Corvallis. This bark contains about 25 per cent of extractives including a complex wax, a coloring matter, fairly large amounts of a catechol tannin and appreciable quantities of a water soluble carbohydrate. A series of three papers which caused some animated discussions extending well beyond the meetings were those by Prof. F. F. Nord and his coworkers, of Fordham University. These biochemists have been studying *lignin* and *lignification*. The first of the papers, by S. F. Kudzin and Nord, was on *hardwood native lignins* from oak, birch and maple, which were compared with that of Scots pine. The comparative studies included chemical analyses and ultraviolet and infrared absorption spectra. The second paper (with R. M. Baun) dealt with *native lignin from cork*. The third article (with Dr. W. J. Schubert) was read by Prof. Nord. It dealt with *enzymatically liberated lignin*, which appears to be identical with the native lignin of Scots pine. This "extra-native" lignin was obtained after a long period of decay of Scots pine with the fungi, *Poria vaillantii* and *Lenzites sepiaria*. Dr. Nord discussed the possible genesis of lignin in wood, introducing some interesting hypotheses.

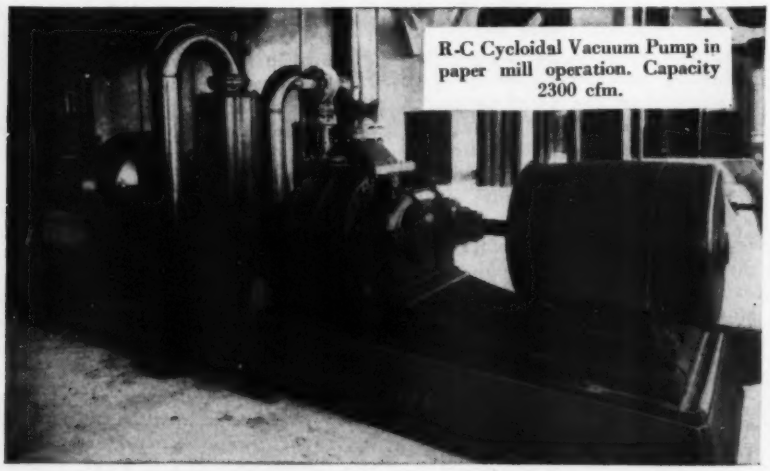
On the morning of September 6, Dr. J. L. McCarthy presided, and the first paper, on the *formation of lignin in wheat plants* was given by Dr. J. E. Stone of the National Research Council of Canada at Saskatoon. This was followed by a paper by Clark, Hicks and E. E. Harris, of the Forest Products Laboratory (presented by Dr. Clark), on the hydrogenation of *Douglas fir lignin*. These chemists identified an entire series of organic compounds among their hydrogenation products. *Catalytic hydrogenation of aspen wood and wheat straw* was also discussed by Messrs. C. J. Brounstein, D. A. Shearer, and J. M. Pepper, of the University of Saskatchewan. Much to the disappointment of many wood chemists, Dr. Wacek and Dr. Kratzl, two eminent Austrian lignin chemists, were not present at the meeting, although their papers were listed. Dr. Kratzl's paper on the *alkaline hydrolysis of lignosulfonic acid to vanillin* was read by Dr. McCarthy. Dr. Wacek's paper, which was not read, dealt with studies on the *lignin-carbohydrate linkage* (in a tropical wood). The *non-degradatory oxidation of lignin sulfonates* was discussed by D. M. Ritter, of the University of Washington.

Studies on the oxidation of fermented sulphite spent liquor with cupric oxide under pressure were outlined by I. A. Pearl and D. L. Beyer, of the Institute of Paper Chemistry. In addition to vanillin, the following compounds were isolated in appreciable quantity: guaiacol, acetovanillone, vanillic acid, 5-carboxyvanillic acid, 5-carboxyvanillin, dehydrodivanillin and dehydrodivanillic acid.

In the afternoon of the 6th, John Calkin served as presiding officer. A stimulating paper was presented by A. M. Johnson, and H. B. Marshall, of the Ontario Research Foundation. They described the *isolation and identification of vanillil, among the oxidation products of sulphite waste liquor*. The content is slight, but its occurrence is of interest. Dr. McCarthy then gave a paper on the *oxidative alkaline cleavage products of softwood lignosulfonates*. His coworkers in this research were R. Davis, E. Reaville, and Q. Peniston. Following this, Drs. Stone and Blundell described their *micro method for the separation and determination of vanillin, syringaldehyde and p-hydroxybenzaldehyde and its application to the oxidation of lignified materials*. This paper gave the techniques used in arriving at the data reported by Dr. Stone in the preceding (morning) session of the Division.

The *nature of sulphite waste liquor sugars* was described by P. K. Mulvany, H. D. Agar, Q. Peniston and J. L. McCarthy. They found that the sugars of the waste liquor (from a mixture of hemlock and white fir) were distributed as follows: 48% mannose, 15% glucose, 15% xylose, 10% galactose, 6% arabinose, and (not more than) 2% fructose. Only 4% were not accounted for. These chemists used partition chromatography on potato starch columns. Other papers given that afternoon included one on the *synthesis and characterization of 5-acetylvanillin*, by Chas. R. Russell, H. E. Smith and L. E. Schniepp, of the Northern Regional Laboratory at Peoria. Their work was evidently stimulated by the highly controversial and questionable proposals on the nature of gymnosperm lignin, made two years ago by the late Dr. Alfred Russell. A description of the *synthesis of dimers and poly-*

mers from guaiacylvinyl compounds related to hypothetical lignin building units was given by D. V. Lent, G. B. Creamer, and E. C. Jahn (of the New York State College of Forestry at Syracuse). It is evident that many of the papers at the meeting dealt with lignin, lignin reactions, or lignin derivatives. Although officially the paper from Syracuse marked the end of the "symposium," some other papers had a distinct bearing on wood chemistry. For example, George J. Hajny, C. H. Gardner, and G. J. Ritter (of the Forest Products Laboratory) described a *thermophylic fermentation of cellulosic and lignocellulosic materials*, which included wood, cellulose, and hemicelluloses discarded as waste by-products from wood processing operations, and sugars obtained on wood hydrolysis. The major fermentation products were acetic, butyric and lactic acids. T. R. Frost and E. F. Kurth (of the Oregon Forest Products Laboratory at Corvallis) reported on *levulinic acid from wood cellulose*, by the action of mineral acids. A yield of over 46% acid was obtained at 170 C. with 2% hydrochloric acid after heating cellulose for one hour.



R-C Cycloidal Vacuum Pump in paper mill operation. Capacity 2300 cfm.

MAY WE ASSIST YOU, SIR?

If you're on a merry-go-round about vacuum pumps, ask ROOTS-CONNERSVILLE to settle things for you.

Our wide line of Cycloidal Vacuum Pumps, built especially for paper mills, offers a choice of standard sizes, all with these important advantages in economy and dependability:

High volumetric efficiencies—accurately maintained clearances, effectively sealed by water, insure high efficiencies; air being handled can be dry, or contain vapors or liquids.

Low friction losses—due to no contact between impellers or impellers and casings.

Higher speeds—permitting direct connection to standard motors, saving first cost, space and weight.

Flexibility—to meet varying vacuum requirements; suction automatically created to overcome resistance in system.

Durability and dependability—simplified design and construction for long-time, attention-free operation.

Tell us your requirements and we'll help find the answer closely fitted to your specific needs.

ROOTS-CONNERSVILLE BLOWER CORPORATION
510 Monroe Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

BLOWER BUILDERS SINCE 1854

ONE OF THE DRESSER INDUSTRIES

At these later meetings (on September 7) Dr. J. S. Tinsley presided. Other papers in the Cellulose Division which deserve mention (and a number of which are highly significant) were the following:

1) *The application of the theory of consecutive reaction to cellulose hydrolysis*, by J. F. Saeman of the Forest Products Laboratory.

2) *Rapid high temperature hydrolysis of cellulose*, also by Dr. Saeman and his collaborators, Messrs. A. M. Kirby, Jr., E. P. Young, and M. A. Millett.

3) *Condensation and hydration reactions with low-grade cellulosic materials*, by Eduard Farber (Timber Engineering Co., Washington, D. C.).

4) *The reaction of formic acid, I—with sugars*, and *II—with polysaccharides*, by H. Tarkow and Alfred J. Stamm (Forest Products Laboratory), papers which have a marked importance because they furnish a new method for measuring accessibility in cellulose.

5) *Characterization of cellulose by measuring its rate of* (alkaline oxidative) *degradation* by R. L. Mitchell.

6) *The relative water sorption capacity as a measure of the degree of accessibility of various cellulose fibers*, by Merle Heath and Marian Johnson (The Institute of Paper Chemistry).

7) *Aliphatic acid esters of cellulose* (prepared by the acid chloride-pyridine procedure) by C. J. Malm, J. W. Mench, D. L. Kendall and G. D. Hiatt (Eastman Kodak Company).

8) *Properties of aliphatic acid esters* (by these same authors).

9) *The periodic acid oxidation of cellulose acetates of low acetyl content* F. W. Herrick and B. E. Hartsuch (Michigan State College).

Many of these papers deserve more than the brief mention here accorded them.

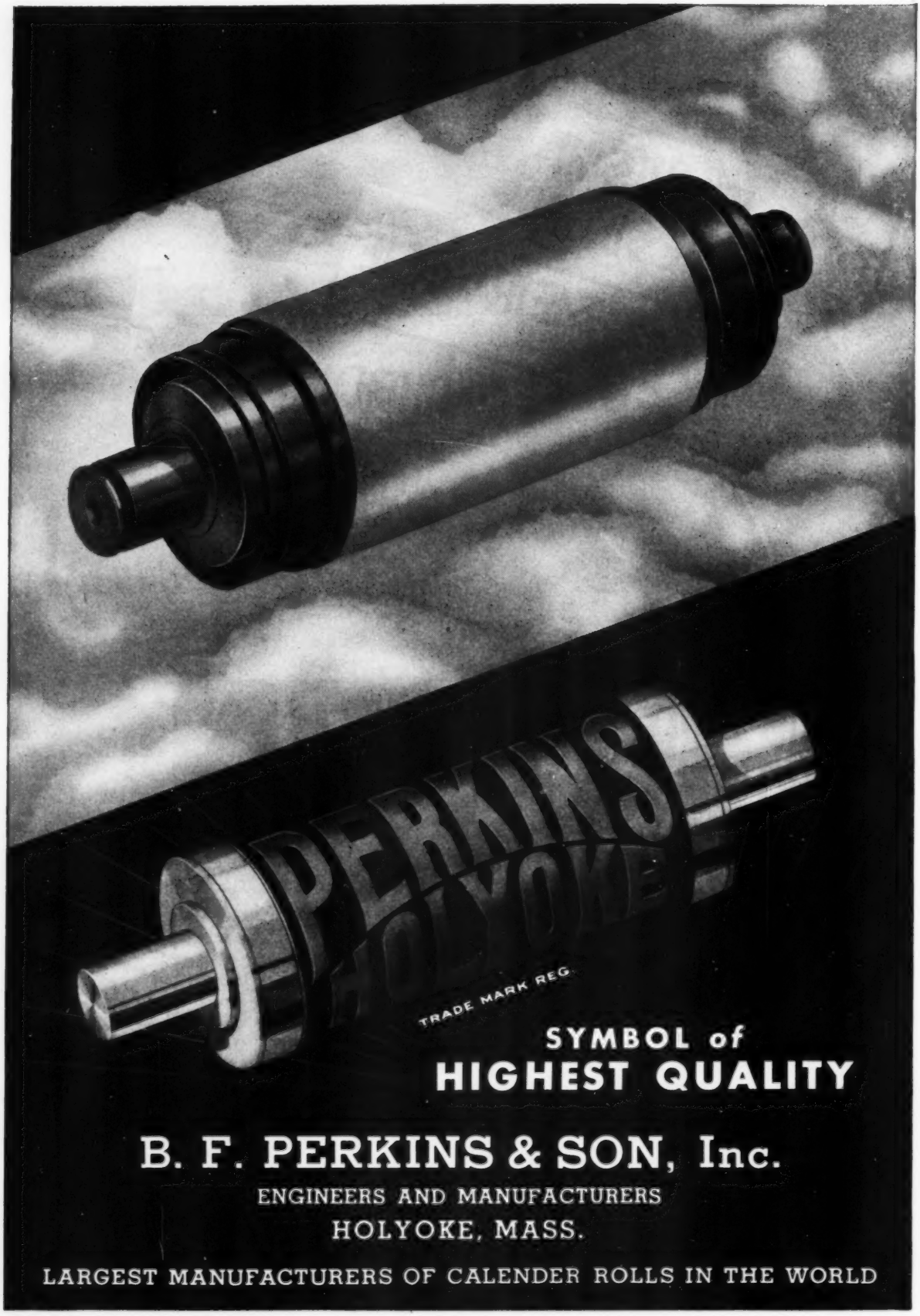
The Cellulose Division held its well-attended luncheon, at the Congress Hotel on September 7.

Quite apart from the meetings, the author had the pleasure of a quiet chat with Dr. Kenyon, of the Eastman Kodak Co., at Rochester. Dr. Kenyon is gathering data on the history of the Cellulose Division—and our conversation brought back memories of earlier days, a quarter of a century ago, when Gustavus Esselen, Harold Hibbert, Lee F. Hawley, A. W. Schorger, Bjarne Johnsen, LeBaron Gray, G. G. Ritter, E. C. Sherrard and a number of others helped bring the Division into being. It was then that a small and enthusiastic group of men informally discussed the constitution of our outstanding natural polymer, and established life-long friendships that helped unify and strengthen the Cellulose Division.

for FINISHI and DESIGN
for SERVICE
for UNIFORMITY
for DEPENDABILITY

APPLETON FELTS

APPLETON WOOLEN MILLS
APPLETON WISCONSIN



SYMBOL of
HIGHEST QUALITY

B. F. PERKINS & SON, Inc.

ENGINEERS AND MANUFACTURERS

HOLYOKE, MASS.

LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

SUPERINTENDENTS TOUR PLANT of Allis-Chalmers Mfg. Co. during meeting of NW Division in Milwaukee. Joseph N. Burrus (left), mgr. A-C Milwaukee office, shows lower casing of centrifugal pump to George Riedel and Carl E. Stohe (National Container Corp., Tomahawk, Wis.) and Hugo Schlenk, Jr. (Northwest Paper Co., Cloquet, Minn.)

Fall meeting of Superintendents NW Division

Prominent speakers . . . national officers . . . marker dedication feature two-day conclave

▶▶▶ A LARGE ATTENDANCE marked the fall meeting of the Northwestern Division of the Superintendents Association, held at the Hotel Schroeder, Milwaukee, Wis., September 15 and 16. Nearly 250 were present.

D. C. Everest, chairman of the board of Marathon Corp., was the guest speaker at the joint luncheon held September 16. In reviewing the history of the Superintendents Association Mr. Everest commented that the Association has grown along with the national consumption of paper and paperboard; that consumption has increased from a per capita use of 119 pounds per year when the Superintendents first united to an approximate consumption of 350 pounds per year in 1950.

After tracing the growth of the use of paper, Mr. Everest remarked upon the present Korean situation in relation to our government and the paper industry. Stating that "To anyone who studies the situation, it is plainly evident that the manpower shortage will be by far the most difficult factor in the whole situation. . . .

"There is bound to be a shortage of raw materials as the paper industry is so dependent on the chemical industry which, in turn, is so closely related to everything which has to do with the war effort. . . . The main difficulty will be a shortage of our primary raw materials — wood, waste papers, and rags . . . ." Mr. Everest warned that "With the controls now in the hands of the President, non co-operation in furnishing military requirements can immediately deprive one of operating supplies and maintenance materials."

New Officers

Immediately after Mr. Everest's address the Association held its business meeting, at which the following officers —nominated in a letter written by F. X. Kreiling, chairman of the nominating committee, and read by Retiring Chairman of the Board L. S. Sabatke—were elected:

Chairman—Mace Harris, Northwest Paper Co., Cloquet, Minn.

First Vice Chmn.—Paul West, Thilmany Pulp and Paper Co., Kaukauna, Wis.

Second Vice Chmn.—Lawrence Murtfeldt, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.

Secretary - Treasurer — Myles Reif, Blandin Paper Co., Grand Rapids, Minn. The nominating committee suggested that Charles Reese, whose membership on the Board of Trustees of the Division expires this year, continue to serve another two-year term.

Those attending the meeting heard four papers, presented Saturday morning. Speakers and their papers included: W. A. Stone, Mathieson Chemical Corp., "Bleaching Kraft Pulp with Chlorite and Chlorine;" Harold Skinner, Marathon Corp., Rothschild, Wis., "The Curlator as a Pulp Refiner;" W. A. Sherman, Flambeau Paper Division, Kansas City Star Co., "Use of Sulphite Waste Liquor as Road Binder;" and C. H. Kemp, Thilmany Pulp and Paper Co., "Safety Factors in a Functioning Program."

Social activities of the two-day meeting included golf and trap shooting and a banquet the evening of the 16th. At the banquet, a golf prize was awarded to Jack Hayes, and Harold Chew received the trap shooting prizes. The banquet was also the occasion of presentation of certificates of appreciation to Past Chairmen F. X. Kreiling and L. S. Sabatke by Roy Kelly, Marathon Corp., past president of the National Association.

Charles Ackley, Crown - Zellerbach Corp., national Association president, was represented at the meeting by Glen Sutton, national Association first vice president, Sutherland Paper Co., Kalamazoo, Mich. Mr. Sutton spoke at the banquet in behalf of the National Association and its officers.

While in Milwaukee, Association members visited A. O. Smith Corp., Allis - Chalmers Manufacturing Co., Hummel & Downing Co., Falk Corp., and Hercules Powder Co.

Commemorative Plaque Dedicated

An outstanding feature of the program was the dedication of a marker commemorating the site of the first paper mill in Wisconsin. The mill, built by Joseph Ludington and John Garland in 1848, was located at what is now 217 No. Plankinton St., Milwaukee. According to Mr. Everest, who commented on the history of the paper industry in Wisconsin, the mill produced 400 pounds of paper per day, and employed 10 people. The original property is now owned by the Milwaukee Road railroad; the marker was placed on the front of the Soo Line freight house, which leases property from the Milwaukee line.

Harry E. Weston, secretary and treasurer of the Superintendents, described the conception of the marker project, and how its placement was achieved. His description of the plaque was of a bronze marker, 24 inches by 36 inches in size which weighs about 100 pounds. The inscription reads "Near this spot on the north bank of the Menominee River, Joseph Ludington and John Garland, during the early part of 1848, placed into operation the first paper mill in the state of Wisconsin.

"Marker erected by the Northwestern Division of The American Pulp and Paper Mill Superintendents Association, Inc.

"Dedicated September 16, 1950."

The marker was unveiled by Fred C. Boyce, Wauwatosa, Wis., first active president of the Association, and L. S. Sabatke, Marathon Corp., chairman of the Northwestern Division, made the presentation commentary; John H. Stewart, general superintendent of The Milwaukee Road, accepted the marker for his company.

TAPPI Testing Conference

The second TAPPI Testing Division Conference was held September 13-15 in the Eastman Kodak Co. Recreation Building at Kodak Park, Rochester, N.Y. Most of the committees of the Testing Division held group meetings for the purpose of discussing and studying present TAPPI Standards and improving them wherever possible.

Committees that participated in the conference were: Pulp testing, paper testing, nonfibrous materials, optical properties, chemical methods, packaging materials, graphic arts, microscopy, and wax testing. Very few formal papers were presented since most of the sessions consisted of group discussions. At the opening session, however, A. E. Bachmann, national TAPPI president, gave a most interesting and provocative paper entitled, "Pulp characteristics in relation to testing methods." He outlined numerous variables that have defied all attempts at measurement and showed that many papermaking problems exist because so little is known of the basic properties of cellulose fibers. James d'A. Clark, general chairman of the Testing Division, presided over the conference.

Host to the conference was the Eastman Kodak Co. One of the most interesting highlights was an afternoon tour through the company's paper mill and through several other departments. Following the plant visit, those attending the conference were guests of Eastman Kodak at a banquet, after which they listened to an interesting talk on the development of color photography by Dr. C. J. Staud, director of research at Kodak Park.

Packing Clinic to Feature Nov. Meeting of Michigan Div. Superintendents

The chief feature of the November 16, 1950 meeting of the Michigan Division of The American Pulp and Paper Mill Superintendents Association, Inc., to be held at the Hotel Harris, Kalamazoo, Mich., will be a packing clinic.

Conducted by J. W. Hemphill, manager of the pulp and paper industry of Johns-Manville Corp., New York, the clinic is the idea of a pulp mill superintendent who felt that much maintenance cost and power consumption could be attributed to improper installing and handling of packings in the stuffing boxes.

Realizing that good packing procedure was the foundation for a preventative maintenance and good housekeeping program for his mill, Mr. Hemphill gathered all available data relative to the use and application of packings to present it to industry men.

A clinic type of presentation, where management, engineering and mechanical men can be brought together in a group meeting was chosen. The Kalamazoo meeting will for the first time bring together representatives of a group of mills in a joint meeting for the clinic.

Michigan Division of Superintendents Ass'n Opens Fall Season

The opening meeting of the season for the Michigan Division of the Superintendents Association was held September 21 at Hotel Harris, Kalamazoo, with O. W. Callighan, chairman, presiding. Attendance at the meeting approximated 105 persons, including members of the Chief Engineers Club of the Kalamazoo Valley, who were guests for the evening.

The dinner meeting was preceded by a reception sponsored by General Electric Co. A period of good fellowship opened the program with introductions of the Michigan Division's new officers and officers of the Chief Engineers Club. Glen Sutton, Sutherland Paper Co. (1st vice president of the National Association) presented a certificate of recognition to W. F. Hathaway, Kalamazoo Vegetable Parchment Co., as the recently retired chairman of the Division.

The feature address of the meeting was given by W. B. Wilson, General Electric Co. His subject was "The Gas Turbine for Industrial Power."

Greetings were received and read at the meeting from Charles E. Ackley, national president of the Association.

Subject Announced for Fourth Bolton Award Contest

The subject of the fourth Bolton Award Contest will be "Why Profit is Everybody's Job." Open not only to members of its sponsor, The American Pulp and Paper Mill Superintendents Association, Inc., but also to all employees in North American pulp and paper mills, the contest carries $3,250 in cash prizes; first prize is $1000, second prize is $750, third prize is $500. In addition, ten prizes of $100 each will be awarded. The awards will be made by John W. Bolton and Sons, Inc., Lawrence, Mass.

Manuscripts for the contest should not exceed 1500 words, and should be typed, double-spaced, on one side of each sheet of manuscript; entries should be addressed to the Secretary-Treasurer, The American Pulp and Paper Mill Superintendents Association, Inc., 111 West Washington St., Chicago 2, Ill. Only entries postmarked before midnight of November 1, 1950, will be accepted.

Judges for the contest will be well qualified persons; their decisions shall be final. All manuscripts submitted will become the property of John W. Bolton and Sons, Inc., who will publish the 13 prize-winning articles in book form for free distribution.

AVERAGE FREQUENCY RATE of accidents for the first six months of the year at the six mills of the Northern Division of International Paper Co. was 6.43, a drop of 24 per cent from last year's score for the period. Only by having a perfect record could the York Haven mill show an improvement over the same period last year; the Tonawanda and Hudson River mills also both materially improved their Frequency and Severity experiences, while both the Niagara and Otis plants reduced their Severity rates. Ten fewer lost time injuries were reported than for the same period in 1949.

Coming Events

Oct. 12-14—Annual meeting Southern and Southeastern Div. of TAPPI, to be held at the George Vanderbilt Hotel, Asheville, N. C.

Oct. 16-20—38th Annual Congress and Exposition of the National Safety Council, Stevens Hotel, Chicago.

Oct. 23-25—Fall Convention of the National Paper Trade Association, to be held at the Stevens Hotel, Chicago.

Oct. 25-27—Alkaline Pulping Conference of TAPPI, at George Washington Hotel, Jacksonville, Fla.

Nov. 7—Pacific Coast section of TAPPI will meet at Camas, Wash., to discuss "Printing and printing papers."

Nov. 12-13—Fibrous Agricultural Residue Conference of TAPPI, at Peoria, Ill.

Nov. 14—Meeting of Metropolitan Section of TAPPI; subject will be "Technical problems of the newspaper industry."

Nov. 16—Packing clinic, to be part of meeting of Michigan Division of the Superintendents Association, to be held at the Hotel Harris, Kalamazoo, Mich.

Nov. 27-Dec. 2—Nineteenth National Exposition of Power and Mechanical Engineering, to be held in Grand Central Palace, New York.

Feb. 19-23, 1951—Paper Week, annual meeting of the American Paper and Pulp Association and paper groups, at the Waldorf-Astoria Hotel, New York City.

April 17-20, 1951—20th National Packaging Exposition of the American Management Association, to be held in Atlantic City, N.J.

Only the HMS will pump this

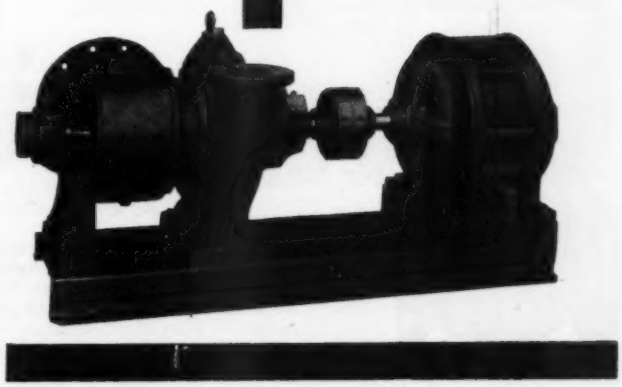
Looking for an extra high density pump? If so, you're reading the right ad.

We've spread eagled four cards and, with dots, indicated the fiber in stock of various consistencies.

1. Any pump will handle stock up to 3%.
2. Most pumps will handle stock up to 6%.
3. A few pumps will handle stock up to 8%.
4. Only the HMS will handle stock up to 11%.

The HMS can and is doing a 11% consistency pumping job where required and an HMS would do as much for you.

Also water and white water designs and the good old reliable plungers for mills that still use them.

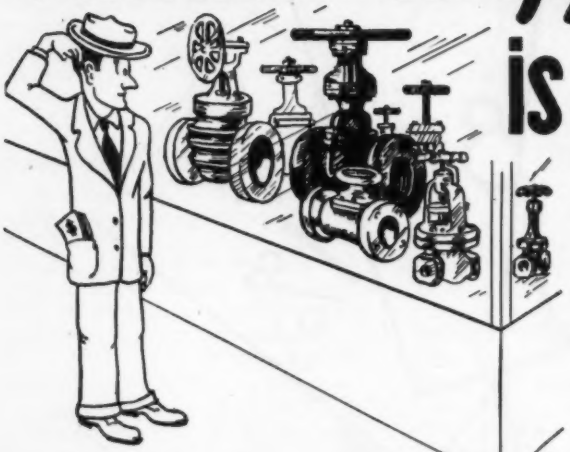


Shartle Bros. Machine Co.

MIDDLETOWN, OHIO

DILTS MACHINE WORKS, Fulton, New York
Divisions of THE BLACK-CLAWSON COMPANY, Hamilton, Ohio
Western Sales Office: Mayer Bldg., Portland, Oregon
Associate: ALEXANDER FLECK LIMITED, Ottawa, Canada
Subsidiary: B-C INTERNATIONAL, LTD., 16 Catherine Place, Victoria, London S. W. 1, England

"Window Shopping" for Valves is poor economy



Reading advertisements is like "window shopping"—it's a good way to see what's on the market. But don't let it influence you into buying your flow control equipment from different sources.

Because if you buy all your valves from one source you avoid these pitfalls:

Complications in stocking spare valve parts.

Difficulties that confront the maintenance department in making repairs on a variety of valves.

The necessity of carrying a much larger stock of repair parts.

The chances of installing valves that are not backed by adequate engineering service.

By offering the *only* COMPLETE line of valves available to Industry today, Powell makes this possible. And if you consult Powell Engineers and select the right valve to suit each individual service, your flow control problems are ended.

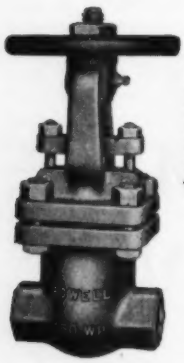


Fig. 2490 (18-8S, 18-8S Mo, Durimet "20") and **Fig. 2492** (Monel Metal, Nickel, Ampco, Everdur, Hastelloy Alloys A-B-C-D). 150-pound O. S. & Y. Gate Valve with screwed ends and solid wedge. Can be supplied with double wedges. Flanged end valves have face-to-face dimensions conforming to MSS SP-42. Globe valves of this design are also available.

Fig. 2433—150-pound Bronze Regrinding Swing Check Valve with flanged ends and bolted flanged cap. Disc has ample lift to permit full, straightway, unobstructed flow through the valve body.

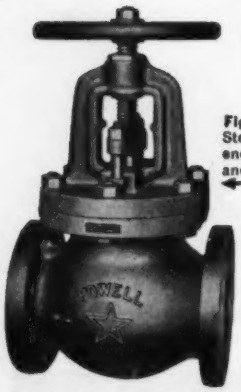


Fig. 1531—Class 150-pound Cast Steel Globe Valve with flanged ends, outside screw rising stem and bolted flanged yoke.

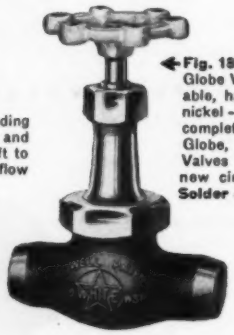


Fig. 1872 — Bronze Solder Joint Globe Valve. Regrindable, renewable, hard-wearing "Powellium" nickel-bronze seat and disc. A complete line of Solder Joint Globe, Angle, Gate and Check Valves available. Write for our new circular — **"Powell Bronze Solder Joint Valves."**

Fig. 1893—Flanged end Gate Valve designed and developed especially for Paper Mill service. Body, bonnet and yoke are cast of 3% Nickel Iron; screwed-in seat rings are of 18-8 SMo; solid wedge is made of Ni-resist.

The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.

Ask your nearest Distributor—or write direct

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

The Paper Industry Names in the News

Van Liew Will Retire as K-C Niagara Falls Mgr. Simonich Will Succeed Him

The director of industrial relations for Kimberly-Clark Corp., Neenah, Wis., John C. Simonich, has been appointed manager of the corporation mills at Niagara Falls, N.Y. Mr. Simonich will assume his new duties in December when the present mill manager, Fred Van Liew, reaches retirement age. The present director of manpower in the industrial relations department, Ralph Kehl, will succeed Mr. Simonich.

Mr. Simonich has been associated with Kimberly-Clark since 1927. Dividing his company experience between manufacturing and industrial relations, he was at one time superintendent of operations at Niagara Falls. In 1941 he became acting director of industrial relations, and assumed full responsibility in 1946.

Retiring Mill Manager Fred Van Liew joined Kimberly-Clark at Neenah, Wis., in 1916 and has been in charge of the Niagara Falls operations since 1937. Previous to his work at Niagara Falls, he was manager of the Badger-Globe division of the Neenah mill.

John C. Simonich

Geo. H. Baker

Baker Heads New Dept. at Wyandotte Chemicals

Chosen as head of a new employee and public relations division of Wyandotte Chemicals Corp., Wyandotte, Mich., is George H. Baker, recently active with American Potash and Chemical Corp. in similar activities.

Mr. Baker, whose new division will co-ordinate all human relationship activities of the firm, was a colonel and assistant to Major General Lewis B. Hershey, director of Selective Service, during World War II. Concurrently, he was head of the manpower section of Selective Service, and had close contact with industry problems.

Seheult To Fill Newly Created Logging Chair at New Brunswick Univ.

The newly-created chair of logging at the University of New Brunswick, has been filled with the appointment of Louis R. Seheult as professor. Dr. Seheult, a native of Port of Spain, Trinidad, is a forester of wide experience who has held several important forestry posts in Canada and the United States.

The new logging chair, to be conducted on the post-graduate level, is supported by four Eastern Canadian pulp and paper companies: Canadian International Paper Co., Ltd.; Quebec-North Shore Paper Co., Ltd.; Fraser Cos., Ltd.; and Bathurst Power and Paper Co., Ltd.

Lee Allan Swen, formerly vice president in charge of the legal department of Foster Wheeler Corp., New York, was recently appointed vice president in charge of the newly-formed International Division, which will be responsible for foreign business of the firm, and will co-ordinate the activities of subsidiary companies in Canada, England and France. Mr. Swen first joined the corporation in 1936 as patent counsel, and was elected a vice president in 1948.

Lunken Is Lunkenheimer Sec'y—Burrage Devotes Full Time to Sales

Upon the resignation of Charles W. Burrage as secretary of The Lunkenheimer Co., Cincinnati, Edmund P. Lunken has been elected to the position. Mr. Burrage, now manager of sales engineering, resigned as secretary to devote his full time to sales.

Mr. Burrage, a graduate of Harvard University, joined Lunkenheimer in 1924, after acting as an instructor at Massachusetts Institute of Technology, working in the engineering department of Manning, Maxwell & Moore, Inc., and serving as chief engineer of Nelson Valve Co.

A graduate of Yale University, Mr. Lunken has been associated with Lunkenheimer since 1936. After serving in several factory departments, he became a sales representative for the firm, and was elected to a vice presidency in 1945. Mr. Lunken served in the Army Air Force during World War II.

Creswell Made P.A. For Spruce Falls—Hofman Returns to K-C Corp.

With the appointment of James A. Creswell as purchasing agent of Spruce Falls Power and Paper Co., Ltd., Toronto, Canada, acting purchasing agent J. D. Hofman will return to his former duties as assistant general purchasing agent of Kimberly-Clark Corp., Neenah, Wis.

Mr. Creswell, whose most recent work with Spruce Falls was that of service operations superintendent of the Kapuskasing, Ontario, plant, served the firm for many years as warehouse superintendent. In addition to the purchasing for the Spruce Falls plant, Mr. Creswell will act as purchasing agent for Kimberly-Clark Corp. of Canada, Ltd.; LongLac Pulp and Paper Co., Ltd.; and Upper Canada Timber Co., Ltd. All purchasing will be conducted from the Spruce Falls offices.

Kenneth G. Lundie, previously sales manager of Johnston Pump Co., Los Angeles, has been elected vice president

Kenneth G. Lundie

Perry H. Brown

in charge of company sales; concurrently, Chief Engineer *Perry Brown* was elected vice president in charge of engineering.

Charlton Made Exec. V.P. of Central Paper Co.

Long active in the pulp and paper industry in the United States and Canada, E. A. Charlton has been elected executive vice president of Central Paper Co., Inc., Muskegon, Mich. Mr. Charlton will also serve as general manager of the firm.

Joining International Paper Co. in 1925 when that firm acquired control of the paper mills on the New York World

newspaper, which he managed, Mr. Charlton served as vice president in charge of operations for that firm from 1927 to 1936. In 1936 he became associated with Field Glore and Co. in a plan to merge several Canadian newsprint companies; from 1938 to 1941 he served as general manager of Crossett Paper Mills, Crossett, Ark.

Recently, as a consultant for Union Bag and Paper Corp., Mr. Charlton supervised the installation of that company's board machine, and was instrumental in completing other major additions to the company's bag factories. Simultaneously, he was consultant for Southland Paper Mills, Inc. As a consulting engineer Mr. Charlton has had as clients Sitroux Inc., The Henry J. Kaiser Co., Chicago Corp., Lukenweld division of Lukens Steel Co., Bauer Brothers, Inc., Pacific Paperboard Co., Tarentum Products Corp., and Central Paper Co., Inc.

E. A. Charlton

James A. Williams

Jas. A. Williams Elected To Manage Potlatch Sales

The former vice president of Bonestell and Co., San Francisco, James A. Williams, has been named sales manager of the pulp and paper mill of Potlatch Forests, Inc., Lewiston, Idaho. Mr. Williams assumed his new duties August 1.

Most of Mr. Williams' life has been concerned with the paper industry; his childhood was spent traveling with his parents, who owned and operated a portable sawmill. A World War I veteran, he attended Northwestern University.

In 1914, Mr. Williams became associated with Dwight Brothers Paper Co.; in subsequent years he was associated with Moser Paper Co., Berkshire Paper Co. and Graham Paper Co., all of Chicago. Working with these firms, Mr. Williams held many positions, and was a salesman in the midwest territory for many years.

In 1943 Mr. Williams joined the Bonestell and Co. firm as San Francisco sales manager; four years later he was made vice president of the firm, a position he retained until his association with the firm was terminated so that he could accept the Potlatch appointment.

Appleton Woolen Changes: Turner—Mooney—Everlien

Two changes in territories have been made in sales department of Appleton Woolen Mills, Appleton, Wis., this month. Claire Turner, who has spent some 25 years in the paper sales field, will service the New England States, previously covered by Joe Mooney. Mr Mooney has retired due to ill health.

The territory of Lou Everlien, previously in charge of the Central Mid-West and Central East territories, will cover the states of New York, Pennsylvania, New Jersey, Delaware, Maryland and the Virginias. The Mid-West Territory will be serviced and contacted from the company's main offices in Appleton for the present.

Reliance Promotions

Three promotions to key engineering positions have been made at The Reliance Electric & Engineering Co., Cleveland. John L. Fuller, formerly responsible for engineering on the firm's large motors, has been appointed technical coordinator; this work will entail co-ordination of special drives, technical investigations, analysis of special projects, and direction of Reliance's experimental program. Mr. Fuller has been with Reliance for 14 years.

The former director of engineering for small Reliance motors, Charles R. Sutherland, has been promoted to the new position of manager of engineering for Reliance's Ivanhoe Division products. This appointment comes after 11 years of service.

The third post, that of manager of engineering for Ashtabula Division products, has been filled by Earl C. Barnes. Mr. Barnes, who joined Reliance in 1940, has been responsible for electrical design of a-c and d-c products made at the Ashtabula, Ohio, plant for the past three years.

Four Executives Given New Posts by Mathieson

Recent changes in the Operating Division of Mathieson Chemical Corp., Baltimore, caused by the company's expansion program, have resulted in the transfer of some personnel and the promotion of several others.

R. B. Worthy, vice president, formerly general manager of both the Saltville, Va., and Baltimore, Md., operations, will now devote his entire time to the Saltville operations. His new responsibilities will include supervision of the construction and operation of the new six-million-dollar electrolytic chlorine plant there.

The former general manager of SASCO operations at Houston, Arthur T. Bennett, has been appointed general manager of the Baltimore operations.

James S. Gilliam has been appointed operating manager of the Sulphur Recovery operations which consist of sulphur recovery plants at McKamie and Magnolia, Ark.

The new operating manager of Southwestern Acid Plants operations—sulphuric acid plants at Port Arthur and Beaumont, Tex., and Bossier City, La.—is R. T. Braun.

Geo. Craigie Associated with Public Relations Group

The former secretary-treasurer of The American Pulp and Paper Mill Superintendents Association, George W. Craigie, has joined the public relations organization of John Orr Young & Associates, Inc., as an associate. Mr. Craigie will make his headquarters at the company's offices at 113 West 57th St., New York City.

John Orr Young, who heads the Young company, is co-founder of Young and Rubicam, well-known advertising firm, and is the author of *Adventures in Advertising*.

Mr. Craigie brings to his new connection a wide acquaintance among mill operators and long experience in the pulp and paper field, which he will continue to serve in his new capacity.

George Craigie

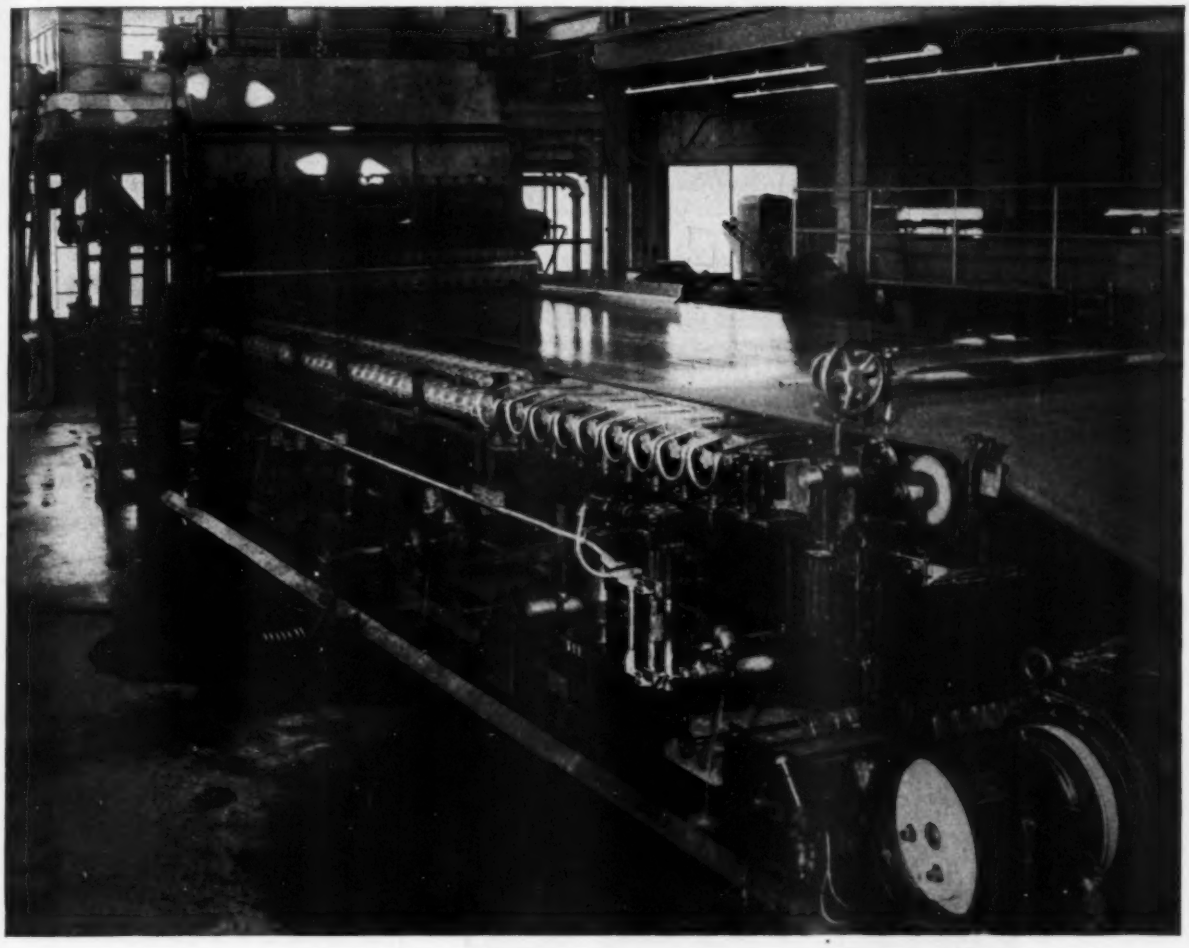
Major-Gen. Waitt

Major General Waitt Becomes an Official of Aries Assoc.

Former chief of the Chemical Warfare Service, Major General Alden H. Waitt (Ret.), has joined R. S. Aries and Associates, New York, as vice president.

General Waitt was a member of the Committee on Chemistry and Chemical Technology, National Research Council, during the years 1945 to 1949; he also served as U.S. delegate to the International Congress of Pure and Applied Chemistry held in London in 1947 and to the International Congress of Industrial Chemistry which met at Brussels in 1948. The author of *Gas Warfare*, General Waitt has contributed numerous articles to civilian and military periodicals.

Harold R. Wheeler, Jr., has joined the Technical Sales Service Department of Clinton Foods, Inc., New York, as a paper technologist. Mr. Wheeler, a grad-



A Stainless Steel Fourdrinier with Built-in Versatility

Few machines ever contained as many new designs or special features to meet exacting modern requirements as the new Downingtown Stainless Steel Cantilevered Fourdrinier now making .009 corrugating at the expanded and modernized mill of Sonoco Products Co., Hartsville, S. C. This Fourdrinier, with a wire 144 inches by 92 feet and speed range of 150 to 1500 FPM, is designed to produce 100 tons of .009 container board daily. There are nine stainless steel flat suction boxes, suction couch roll with double suction box opening, a stainless steel head box with five point stock inlet, several passes to even the flow, two stainless steel distributing rolls, a foam shower, and both high and low speed stainless steel slices. Plus these other exclusive Downingtown features—easy wire changing, new level adjustment while running, new type shake rails, modern multiple shake mechanism, balanced wire rolls, new motor-operated stretchers, new permanent piping, no connections to break when changing wire and new corrugated stainless steel save-alls. This is versatility and perfection in paper machine manufacture! And here's conclusive proof: The machine produced saleable paper on the first roll! For the best in Fourdrinier and board machines and auxiliaries, consult Downingtown.

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY SINCE 1880

uate of the University of Maine, was previously associated with Oswego Falls Corp. as chief chemist of the Pulp and Paper Division, and later was chief chemist at Rochester Paper Co., Rochester, Mich.

Dr. R. H. Lueck, former manager of sales for the Pacific Division of American Can Co., New York, has been appointed general manager of research for the company. Dr. Lueck, who joined American Can in 1922, will make New York his headquarters. *A. C. Staley,* formerly assistant general sales manager, has assumed Dr. Lueck's former work and will make San Francisco his headquarters.

Gordon A. Jacobs has been appointed representative in charge of the Dallas Division of Detrex Corp., Detroit. Mr. Jacobs' territory will include Texas, Louisiana, Oklahoma and Arkansas.

Lawrence H. Carr has been named director of engineering and research for Edward Valves, Inc., East Chicago, Ind. A member of the Edward technical staff since 1936, Mr. Carr was previously chief metallurgist; in his new work he will be responsible for consolidating the development functions of engineering research, product engineering and technological specifications for process control.

William P. Dohne has been appointed technical director of the Hawthorne Paper Co., Kalamazoo, Mich. For the past seven years, Mr. Dohne has been associated with W. C. Hamilton & Sons, Miquon, Pa.

George N. Collins, formerly general works manager of J. W. Beardsley's Sons, has joined Wallace Clark & Co., Inc., New York. An industrial engineer, Mr. Collins has specialized in materials handling methods, wage incentives, and standard costs.

Henry M. Sossaman has been named general sales manager of Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Philadelphia. In his new position Mr. Sossaman will be in charge of sales of all products manufactured by Quaker Rubber, including conveyor and transmission belting, hose, packing and miscellaneous industrial products.

Robert F. Curry has been appointed to the Detroit office of the De Laval Steam Turbine Co., Trenton, N.J. Concurrently, the firm has appointed the R. M. Sorile Co. of Kalamazoo, Mich., to handle sales in the western half of the lower peninsula of the state.

E. H. Graves has been appointed manager of the Hopewell, Va., plant of the Continental Can Co., New York; concurrently, *Lester J. Smith* was named manager of the Continental subsidiary, Gould Paper Co., Lyons Falls, N.Y.

Erling Klafstad has been appointed assistant director of engineering for the Hancock Valves and Consolidated Safety and Relief Valves departments of Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Mr. Klafstad was formerly vice president in charge of engineering and manufacturing for the Crosby Steam Gage and Valve Co.

William C. Hookway, Jr., has been made assistant to the chief engineer of Cooper Alloy Foundry Co., Hillside, N.J. He has been acting as the company's sales representative for the No. New Jersey area. Previously, Mr. Hookway was with H. A. Wilson Co., and for eight years was a marine engineer for Gibb and Cox, Inc., where he was recognized as a piping specialist.

NAYLOR PIPE *is ideal for Paper Mill service because it's LIGHT in Weight... yet HEAVY on Performance!*

Sizes from 4 to 10 inches in diameter and thicknesses from 14 to 7 gauge. All types of connections, fittings and fabrications. Write for complete details.

NAYLOR PIPE COMPANY
1236 East 92nd Street, Chicago 19, Illinois
New York Office: 350 Madison Avenue, New York 17, N. Y.

At **MANDO**

American *DiesELectric*★ Locomotive Cranes

"Do twice the work at half the cost!"

They think in big figures, at Minnesota and Ontario Paper Company. When they proved to themselves that American 40-Ton DiesELectric Locomotive Cranes cut fuel costs in half, and doubled work output per crane, they saw *big savings* involved.

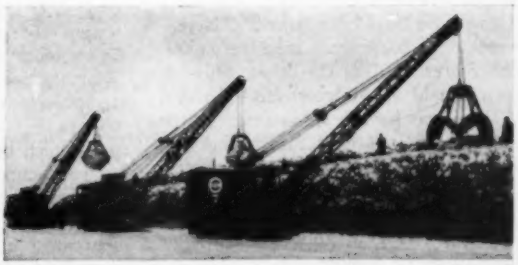
As a result, Mando is now replacing all steam cranes with swift, efficient American DiesELectrics . . . one for two. Each of the new machines handles about 30 carloads of wood on an 8-hour shift. One man runs each crane. There is no time out for steaming up, or for coal or water stops.

Do these figures make yours look out of date? Mail the coupon below, for facts on *modern* material handling.

★Diesel-Electric Locomotive Crane Patent No. 2083460. Touch Control Patent No. 2370856.

FAST AND VERSATILE, these cranes handle car switching and many other jobs. This one is installing a 30-ton turbo-generator.

280,000 CORDS of pulpwood in the world's largest pulpwood storage facility. Mile-long yard contains 42 storage ranks, 20 feet high, served by both truck and rail cars.



THREE DO THE WORK OF SIX! The American 40-Ton DiesELectric shown here are doing work of six steam cranes. Each "bite" moves about three tons of wood. The 50 and 55 foot booms make a simple task of piling the pulpwood to a height of 20 feet.

American Hoist

& DERRICK COMPANY

St. Paul 1, Minnesota

Plant No. 2: SO. KEARNY, N.J.

Sales Offices: NEW YORK • PITTSBURGH • CHICAGO

American Hoist & Derrick Co. • St. Paul 1, Minn. 5602

Please send data on American DiesELectric Locomotive Cranes_____tons capacity.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

41

R. H. Mosher to Direct New Product Promotion for Miami V. Coated

The appointment of Robert H. Mosher to an executive position with The Miami Valley Coated Paper Co., Franklin, Ohio, has been announced. In this connection, Mr. Mosher will be in charge of all manufacturing operations and related activities of the firm, and also will be responsible for new product development and promotion.

Mr. Mosher's former company association was that of manager of manufacturing, Holyoke Card & Paper Co., Springfield, Mass. He left that connection to enter the consulting field and was active in that work for about six months. During that period, he did some work for The Miami Valley Coated Paper Co., which led to his present connection.

R. H. Mosher

After graduating from the University of Massachusetts, Mr. Mosher won a scholarship to the Institute of Paper Chemistry at Appleton, Wis., where he did graduate work. He is the author of a recently published book on *Specialty Papers*, a historical work on the paper industry. Another book, *Technology of Coated and Processed Papers*, will soon be released.

A-C Engineers Appointed Sales Representatives

Four men have been named sales representatives to general machinery division offices of Allis Chalmers, Milwaukee. Donald H. McIntosh and Kenneth V. Knudson have been assigned to the Chicago offices. Mr. McIntosh, a graduate of Iowa State College, has been with the firm since 1942. Mr. Knudsen came to Allis-Chalmers in 1949 immediately following his graduation from Illinois Institute of Technology.

Assigned to the Milwaukee office is Delpherd H. Verhein, who came to the company following his graduation from Marquette University in 1948. A 1948 graduate of Michigan Tech, Daniel Boland, will represent the firm in Davenport, Iowa.

C. N. Sugden has been appointed assistant director of engineering for gauges and instruments by Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Harry S. Moore, director of engineering and development, has announced that Mr. Sugden's successor as chief engineer for gauges is Robert Ingham.

A. E. Young, formerly head of the Dow Chemical Co., Midland, Mich., coatings technical service, has been appointed assistant to R. H. Boundy of the plastics division. Mr. Young's former assistant, *Norman R. Peterson*, has been named head of the coatings technical service, while *Elmer K. Stilbert* is assistant of that department.

R. Baxter Mitchell, general manager of the Escanaba, Mich., operations of the Harnischfeger Corp., passed away September 19 at the age of 59. Mr. Mitchell, who joined Harnischfeger in 1936, took over the Escanaba position in 1947. The widow and one son survive.

Edward J. Sullivan has announced his resignation as eastern sales manager of Gould Paper Co., subsidiary of Continental Can Co., New York, effective October 15. Mr. Sullivan was previously associated with Oxford Paper Co. and Fraser Paper Ltd.

H. Waddle, formerly manager of the New Orleans office of E. C. Atkins and Co., Indianapolis, Ind., has been appointed to the position of manager of mill and supply sales. With the recent closing of the New Orleans office, Mr. Waddle will make his headquarters in Indianapolis, where activities of the New Orleans office have been transferred.

The Paper Industry Necrology

J. E. Kieffer

An automobile accident September 20 caused the passing of John E. Kieffer, president and founder of Kieffer Paper Mill, Brownstown, Ind. He was 78 years of age.

Mr. Kieffer, who began his career as a laborer in a paper mill in 1897, became a machine tender a few years later, and by 1907 had formed a partnership with two other men to lease—and purchase within six months—an unused wheat straw mill at Brownstown. Switching from the use of wheat straw to that of scrap paper, Mr. Kieffer invented the "Shoksorb," a cushioning absorbent paper, which became the mill's chief item of production.

Active in his business until the time of his death, Mr. Kieffer had foregone retirement in 1948 when his plant was completely destroyed by fire, so that he might assume active charge of the rebuilding. Throughout his life he had been active in civic and state affairs.

The widow, two children and three grandchildren survive.

G. Harold Young

One of the outstanding authorities on paper drying in the paper and textile fields, G. Harold Young, vice president and chief engineer of Midwest-Fulton Machine Co. of Dayton, Ohio, passed away September 5 at the age of 48.

A graduate of the University of Cincinnati, Mr. Young joined Fulton Engineering Co.; when that firm was merged to become Midwest-Fulton Machine Co., Mr. Young became chief engineer of the new firm. In 1945 he was elected a director and vice president of the company.

Survivors are the widow and one son.

Clarence E. Kinne

The former president of Bagley & Sewall Co., Watertown, N.Y., Clarence E. Kinne, passed away September 13 at the age of 81.

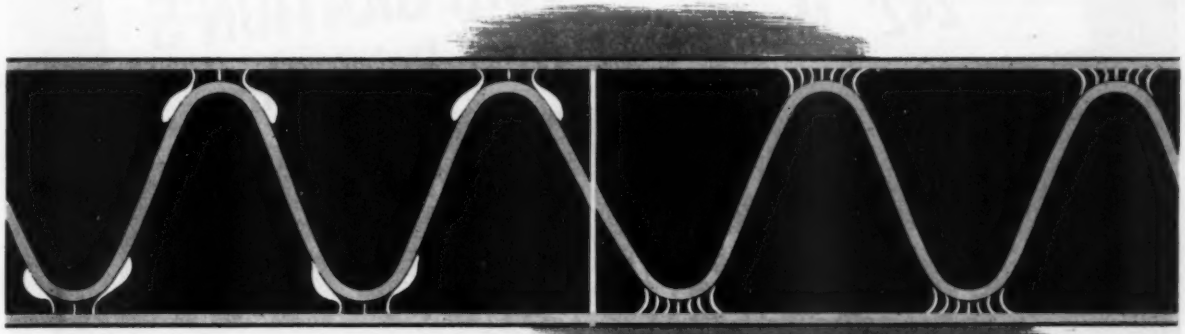
Mr. Kinne, whose retirement from Bagley & Sewall in 1940 ended a 47-year association, first joined the firm as a draftsman and earned a reputation as one of the world's leading paper machine engineers. The widow and one daughter survive.

C. B. Smith, Kalamazoo, Mich., area representative for Noble & Wood Machine Co., Hoosick Falls, N. Y., passed away September 6, at the age of 64. An active member of the Michigan Division of the Superintendents Association, Mr. Smith had been allied with the papermaking industry since an early age. The widow and one sister survive.

Robert E. McLennon, salesman for the Crossett Paper Mills, Crossett, Ark., passed away August 16. Mr. McLennon, who had been with the Crossett firm since 1936, was recently elected vice president of the Southern Paper Makers Association. The widow and one child survive.

KELSIZE...

for Uniform Adhesive Application and Moisture Control in Corrugated Paperboard



NOT-this

UNCONTROLLED APPLICATION OF ADHESIVE

1. Excess adhesive.
2. Wasted adhesive serves no purpose.
3. More adhesive used . . . more moisture to remove.
4. Slower machine speeds.
5. Limp board.

this

CONTROLLED ADHESIVE APPLICATION WITH KELSIZE

1. Less waste . . . adhesive savings.
2. Adhesive where you want it . . . where it's needed.
3. Less adhesive used . . . less moisture to remove.
4. Higher machine speeds.
5. Reduced warping . . . stiffer board.

Only 15/100 of 1% of Kelsize in starch corrugated adhesive is required to give you these important advantages.

KELCO
REFINED ALGIN PRODUCTS

KELSIZE ...a product of KELCO COMPANY

20 N. Wacker Drive
CHICAGO - 6

31 Nassau St.
NEW YORK - 5

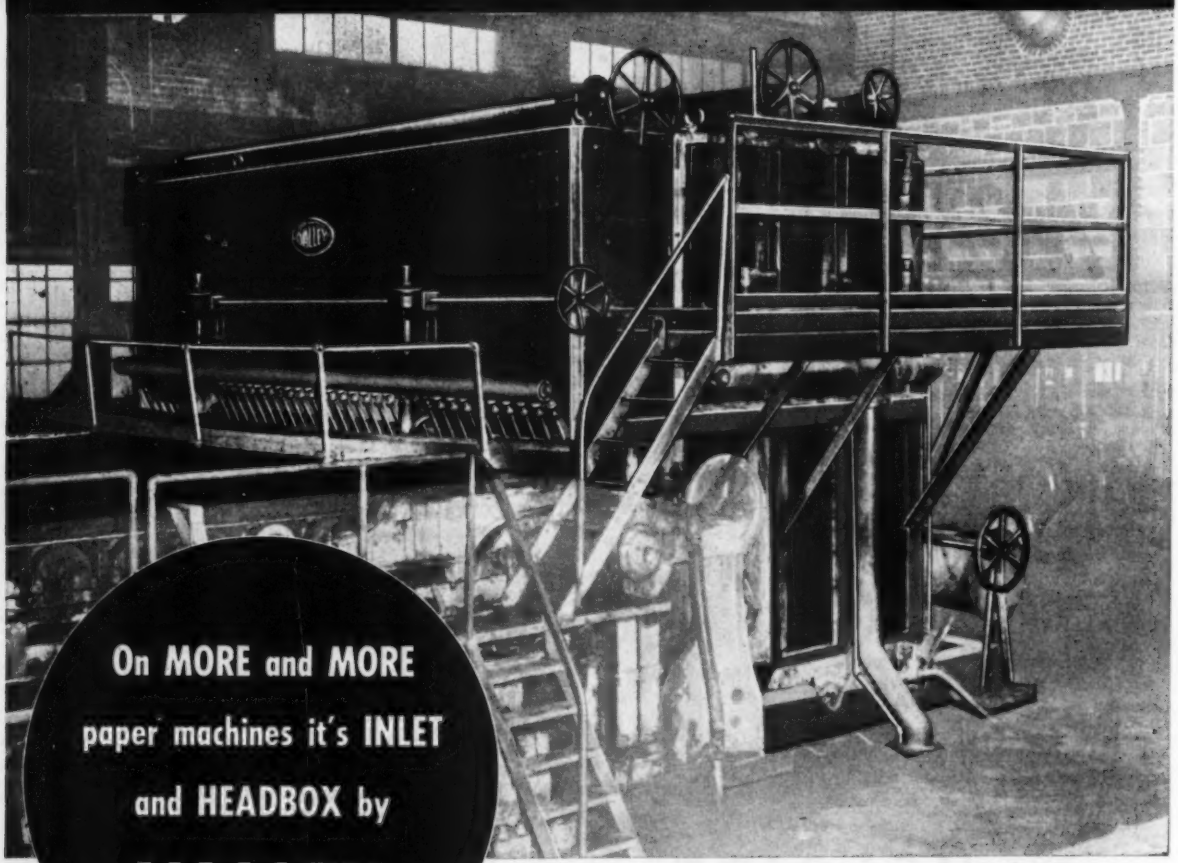
530 W. Sixth St.
LOS ANGELES - 14

Another Inlet and Headbox by VALLEY

on CHESAPEAKE CORPORATION'S 242" Machine at West Point, Va.

For Paper and Board

from 1200 FPM down to 275 FPM



On MORE and MORE paper machines it's INLET and HEADBOX by **VALLEY**

VALLEY IRON WORKS CO.
Appleton, Wisconsin

FORMATION CALIPER LEVEL SHEET INCREASED SPEED HIGHER TEST

Annual Convention of German Pulp and Paper Chemists and Engineers at Konstanz (Germany)

▶▶▶ The association of *German Pulp and Paper Chemists and Engineers* (Verein der Zellstoff und Papier-Chemiker und Ingenieure) met at Konstanz on June 27-30, 1950. This, its annual convention, was attended by about 700 technical men, and included 14 guests from Austria, 19 from Switzerland, 13 from Sweden, 5 from France, and an unrecorded number of participants from England, Italy, Jugoslavia and Brazil. The following papers were presented on June 27: *Possible uses of high frequency and radiation drying in the paper industry* by Kegel (of Berlin) and Kaufmann (of Essen); *Heat technological problems in sulphite pulp production* (by Chief Engineer Edling, of Stockholm); *The status of board made from wood fiber and wood shavings* (by Dr. Klauditz of Braunschweig); *Recent investigations in the field of wood plasticization* (by R. O. H. Runkel of Reinbek); *Electrotechnical problems in the paper and pulp industry* (by Dr. Philippi of Frankfort) and *Ventilation, drying, and digestion* (by H. Kohlmann, Bad Soden (Taunus).

On June 28, the business meeting of the association was addressed by its president, Dr. Müller-Clemm, in the Konstanz City Theater. After giving his reports, he was reëlected by acclamation. Despite the heat, the meeting place was crowded to capacity, even standing room was at a premium. The following papers were then presented: *Electronmicroscopy of cellulose* (by Frey-Wyssling of Zürich); *New developments in the chemistry of sulphite and sulphate pulping processes* (by Prof. Brecht, of Darmstadt); *A trip to America, in the framework of the Marshall plan* (by Prof. Hägglund of Stockholm); the *Lignin-Carbohydrate linkage* (by Prof. v. Wacek of Graz); *Native and Artificial Lignin* (by Prof. K. Freudenberg of Heidelberg) and *Structural and Chemical Differences between sulphite and sulphate pulps* (by Prof. G. Jayme).

Subsequently, a dinner was held in the spacious council chamber of Konstanz, and the meeting was addressed, in friendly fashion by M. Noel, governor of the French military government, who stressed the necessity that the nations of Western Europe work co-operatively and in harmony. President Müller-Klemm of the Association replied to this greeting, and the evening ended with an informal dance, graced by the lady papermakers.

On Thursday, the following addresses were given: *Limits on the productivity of the forests of Western Germany* (by Prof. Speer of Freiburg); *A fight against slime producing bacteria in a paper mill* (by J. Groult, Grande Couronne, France); *Urea resins in the paper industry* (by Wilfinger, Ludwigshafen); *Experiences with new pulps used in viscose production* (by Dr. Bartunek, of Oberbruch); *Preparation and properties of cellulose urethans* (by Dr. Coenen, Uerdingen) and *Ultraviolet absorption spectra of lignin and lignin-like substances* (by A. W. Sohn, Mannheim). These talks completed the technical part of the meeting. In the evening, the association members witnessed a performance of Paul Satre's *"Les Mains Sales."*

The last day was devoted to an interesting excursion by steamer to Lindau via Friedrichshafen (on the Bodensee). The real objective was a visit to the official of the Escher Wyss machine works in Ravensburg, who acted as hosts, and which threw their interesting plant open to the visitors. The parent works (in Zürich, Switzerland) made the machinery for a complete paper mill in 1841. The Ravensburg plant began its operations in 1856 (subsidized in part by the Royal Württemberg Government and by the town of Ravensburg). The latter used some of the bricks of its old town wall for construction of the plant. The machine works now builds board machines, screens, thickeners, fine paper machines and some special equipment, produced under licensing agreements with manufacturers in the U.S.A.

The visitors found that Ravensburg was the site of several paper mills early in the 15th century, which even in the early days through their trade associations, exported paper to Italy and Spain. The association visitors also inspected the works of Albert Bezner, manufacturers of special machinery.

After a final dinner at the Bahnhof Hotel at which the guests were again addressed by Dr. Müller-Clemm, the members returned to Konstanz by boat. The meeting was signalized by the high percentage of eminent, internationally recognized research workers and by its enthusiasm and was evidently a great success.

New Zealand Newsprint

Newsprint manufactured at Lufkin, Texas, of pulpwood from Kaingaroa State Forest, New Zealand, has arrived in the Dominion. The paper was manufactured to test the suitability of New Zealand grown *Pinus Radiata* logs from Kaingaroa, being shipped to the United States some time ago.

A sample of the paper has already been used successfully for newspaper production. Early this year the *Lufkin Daily News* (according to Australian press reports) printed an issue on newsprint made from New Zealand raw materials.

The *Dominion*, Wellington, has agreed to make a trial printing on a quantity of the consignment which has now reached New Zealand. On October 23, 1947, the *Dominion* made a trial printing on newsprint of New Zealand but the paper used was manufactured in Australia.

Paper Mills in Pakistan

It is expected that by 1952, a 30,000 ton mill will be in operation at Kaptaimuk, in the Chittagong Hill tracts of East Bengal. Plans are reported to have been submitted by Canadian and Swedish consultants.

The establishment of a 100-ton paper mill for East Pakistan has been recommended. The raw materials for pulp manufacture would be the local bamboo, salt and lime, which exist in sufficient quantities. (Dyes and other chemicals would be imported.) At present the annual consumption of paper and board in Pakistan is approximately 20,000-25,000 tons, and is met entirely by import. *Indian Pulp and Paper* 4, 458 (1950).

ECA Authorizes Kraft Mill for Frantshoch, Austria

The Economic Co-operative Administration has authorized $1,297,000 for the purchase of modern machinery in the United States for a sulphate pulp and paper mill at Frantshach, Austria. The mill, owned by Natronzellstaff-und Papierfabrik Aktiengesellschaft, is Austria's sole producer of sulphate pulp and paper. With the addition of the new machinery, sulphate pulp production will be increased from 18,000 to 24,000 metric tons a year, and kraft paper production would be doubled. The new papermachine will be used exclusively for production of kraft paper for multiwall bags needed in Europe.

Newsprint Developments In Australia

Production of newsprint in Australia in 1949 was estimated at 32,000 long tons, or at about capacity rate, compared with 31,350 tons in 1948. Australia's newsprint output is the production of one mill located in Tasmania. Capacity of the mill is being expanded, and production is expected at the rate of 80,000 tons annually by the end of 1950.

Imports were estimated at 128,000 tons in 1949—somewhat over the 117,000 tons imported in 1948. Canada was the leading source of the 1949 imports, having supplied 45,000 tons. Other sources were, in order: United Kingdom, 28,000 tons; Sweden, 27,000; Finland, 20,000; Norway, 6,000; and Austria, 2,000 tons. (From *Foreign Commerce Weekly*)

Foreign Abstracts . . . . . .

French Researches on Straw Pulp

Comparative studies were made using various processes for preparing chemical pulps from straw. The following were investigated: (1) digestion with caustic soda at high pressure; (2) multistage digestion with caustic soda at atmospheric pressure; (3) the kraft process; (4) the mono sulphite process; (5) delignification with chlorine gas, following digestion with caustic soda; and (6) delignification with chlorine water following digestion with caustic soda. In each of these, the digestion times and concentrations were varied in attempts to find optimum conditions. Subsequently the pulps were bleached. Delignification was most fully achieved when the process involved the use of chlorine. The pentosan content was only slightly affected by the degree of cooking and was most noticeably reduced only in process (2) (above). The copper number was highest in pulps prepared by process (5), in which chlorine oxidizes the cellulose.

Chlorination processes give a pulp lowest in ash. When bleached to a high brightness, the pulp content is reduced and the copper number increases. Sheet properties on pulps made by each of the processes (at similar levels of digestion, beating and bleaching) are tabulated. Consumption of reagents, yields and chemical analyses are given. In general, the products are so similar that the choice of a production method depends largely on economic factors. Straw pulps may be used alone, or in combination with other pulps in paper manufacture.

The author suggests that, in sugar refineries or in distilleries, when there are large stocks of wheat in the vicinity and where heating units remain idle during a large part of year, the plants might produce straw pulp, in an expanding market. Twelve tables and 2 figures are given. R. Renaud. *Chimie et Industrie* 63, 252-7; 625-32 (1950). (In French); through *Bull. Inst. Paper Chem.* 20, 904-5 (1950).

Effects of Varying Machine Conditions

In an individual paper machine run, the author was able to change three variables and thus obtain eight different samples of paper. The variables which were chosen to show, if possible, outstanding differences, were *shake (I)*, *dandy (II)* and *intermediate calender (III)* (Intermediate calendering meant passing the sheet through a single calender nip, in the middle of the dryer section of the machine). Table below gives the resulting strength characteristics of the eight paper sheets. In A, *I, II* and *III* were all used; in B, only *I* was omitted; in C only *II* was omitted; in D, only *III* was omitted; in E, *I* and *II* were omitted; in F, *II* and *III* were omitted, in G, *I* and *III* were omitted, and in H, *I, II* and *III* were all omitted. The over-all results are fully discussed by the author. From the strength standpoint, A and D are the best sheets, D (without intermediate calenders) giving the highest burst, and A *(with* these calenders) giving the best tensile in the machine direction. The general conclusion reached is that the use of *I, II* and *III* must all be considered as necessary. G. W. Olive. *The Paper-Maker and Brit. Paper Trade J.*, 120, No. 1, 27-30 (1950).

Soda Recovery and Losses in Kraft Pulping

Surveys indicate that the greatest soda losses occur in the recovery room, particularly those from the furnace, and equipment used to recover fume and heat from furnace gases is described in detail. A flowsheet charts the operations at the Maryvale Mill in Victoria, and soda losses are tabulated and compared with those obtained in overseas mills. The analyses of recovered material are also compared, and the effect of recovery methods and efficiency (as well as furnace operation) on resulting sulphidity are discussed.

Methods are given for detecting and recording soda losses and potential savings at Maryvale are outlined. Possible errors in estimating soda stock are outlined, showing where the so-called "fictitious losses" occur. Thirty-six references. H. A. Reid (Australian Paper Mfrs. Ltd., Traralgon, Victoria). *Proc. Australian Pulp Paper Ind. Tech. Assn.*, 3, 338-57 (1949); discussion 357-60.

Wet Strength of the Pulp Web. II

The first of these articles was abstracted in *The Paper Industry* 31, No. 10, 1223. In contrast to the *initial wet strength* of a pulp web, is the so-called "secondary wet strength" *(I)* which results from rewetting of the dried sheet. *I* seems to be very little influenced by the characteristics of the pulp, or by its treatment. For example, the period over which the pulp sample is immersed in water has no effect on *I* (when the sheet is then pressed in each case to a definite water content). The breaking length *(II)* and breaking load *(III)* of a dry chemical pulp sheet increased with increasing gram/cubic centimeters; the greatest increase being shown by sheets highest in grams/meters squared. *II* and *III* of the dried sheet decreased sharply with increasing thickness at a constant 75% moisture content the changes in grams/cubic centimeters or in the thickness of sheet had no effect on the secondary wet strength *(I)*. *(II)* of a rewetted sheet increased, and *III* decreased with an increase in grams/square meters.

Graphs are shown in which *II, III,* the weight/unit volume, and capillary rise, respectively are plotted against degrees Schopper Riegler (deg. S.R), using a pulp termed *Zemofaserstoff*. I is unaffected by increased deg. S.R., but both the initial wet strength and the strength of the dry sheet *(II* and *III)* show a rise with increasing deg. S.R. Capillary rise in Zemo pulp (determined in millimeters per 10 minutes) decreased with increased beating (to 28 deg. S.R., when it remained approximately constant to 32 deg. S.R.).

When beater additives are used as binders these have a marked effect on *II*, but this value is almost unaffected by fibrillation, and only slightly affected by hydration (when the pulp is beaten from an initial 16 to 32 deg. S.R.). Whereas, in sulphite pulps, the differences in fiber length have a marked effect on the *II* and *III* of the dry pulp, *I* seems unaffected by such differences. With dry pulp the tensile strength increased with decreasing fiber length. The *initial wet strength* is also affected by fiber length, but here the highest strength was shown by pulps of intermediate fiber length. The practical significance of laboratory findings is discussed. Helmut Schröter. *Das Papier* 4, 278-85 (1950). (In German).

A Seamless Loud Speaker Membrane—A Molded Product

The various stages in the manufacture of loud speaker cones are described briefly. The machinery required in the operation is also described. Practically all available pulps (including sulphite, sulphate, rag, straw and mechanical pulps) have been used for this purpose, but the best results are evidently obtained with esparto pulp. The product however, requires further improvement, which implies co-operation between the papermaker and radio engineer. Two diagrams are given. Friedrich Heim *Allg. Papier-Rundschau*, No. 2 44-5 (Jan. 30, 1950). (In German)

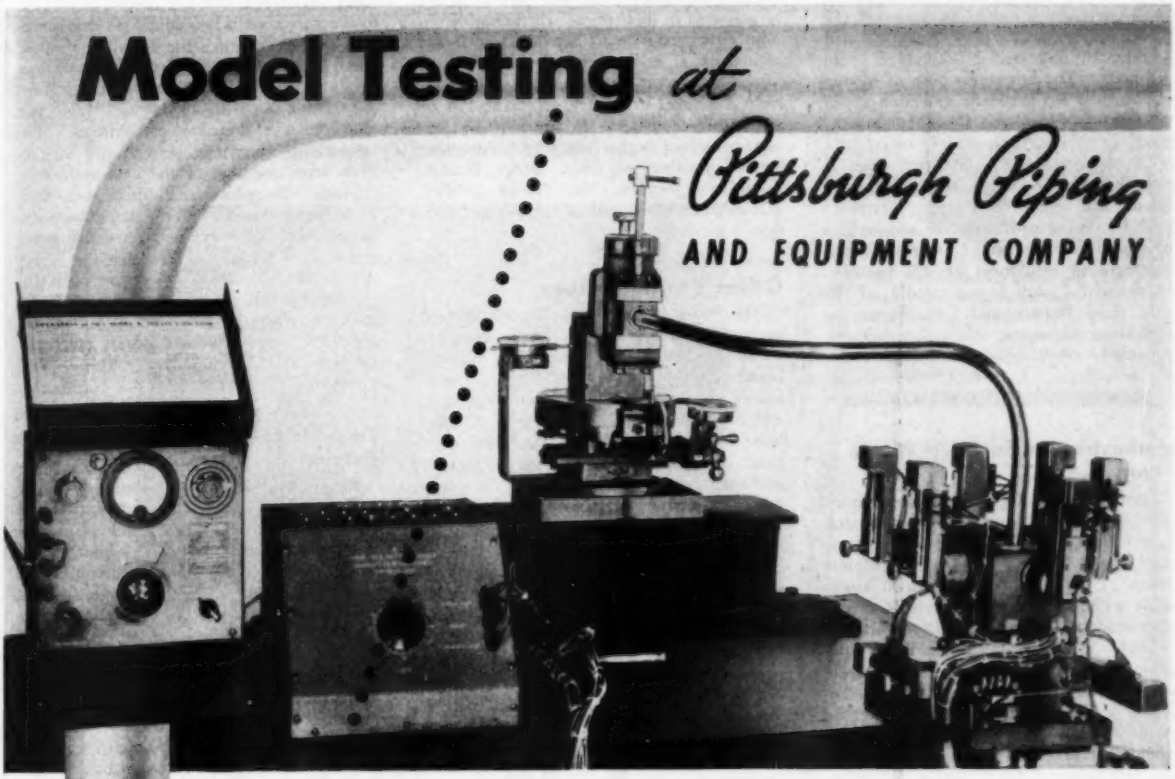
Brightening of Eucalypt Groundwood by Various Pretreatments

Pretreatment with 1% sulphuric acid for five minutes at 40-50 degrees at 1.75 stock density served to remove calcium and magnesium which interfere with subsequent alkaline extraction. The latter involves 1.25% aqueous caustic soda for 20 minutes at 60 degrees using 5% stock density. An aftertreatment with 0.2% sulphur dioxide and sufficient sulphuric acid to bring the *p*H to 5 is carried out for 0.5 hour at 20 degrees with a 2-3% stock consistency. (The quantities of all chemicals are expressed in terms of oven-dry pulp.)

The acid pretreatment with acid may be replaced by use of sodium hexametaphosphate which forms a stable complex with calcium. This treatment increases the

Sheet	Basis Wt.	Bulk	Burst Factor	Tear Factor		Tensile Strength			Stretch (%)	
				Machine	Cross	Machine	Cross	Ratio	Machine	Cross
A	71.8	1.27	27.6	56	88	7190	3281	2.19		2.0
B	71.0	1.26	26.8	68	93	5320	3830	1.39	0.8	2.0
C	72.3	1.31	27.0	66	66	6012	3220	1.87	1.8	1.9
D	69.0	1.50	29.3	75	91	6848	3305	2.07	1.1	2.4
E	71.9	1.36	23.7	61	73	5205	2967	1.75	0.9	1.6
F	70.2	1.55	28.2	56	68	6230	3051	2.04	1.0	2.2
G	71.2	1.63	25.3	65	73	4778	3238	1.48	0.9	1.8
H	71.2	1.61	27.0	55	67	5875	2973	1.98	1.0	2.0

Model Testing at Pittsburgh Piping AND EQUIPMENT COMPANY



The Modern Method for Complete, Practical Pre-determination of Piping Flexibility

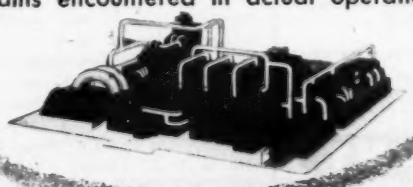
Model testing is one of the many technological advancements thoroughly investigated and proved by Pittsburgh Piping and Equipment Company before being made generally available. It provides complete advance knowledge of the reactions of any type, size, and system of power piping.

The testing apparatus shown above accurately measures and directly indicates the physical reactions of a section of pipe which exactly duplicates, in miniature, the planned layout. These measurements are projected to give precise information on the full size system as a check against theoretical calculations.

On complex piping layouts, model testing provides a complete analysis instead of theoretical approximation; it is a time and labor saver; and the possibility of mathematical error is minimized. Its use helps to avoid excessive stresses, reactions, and movements in the final system which could affect joints and thus cause leakage, or damage anchors and equipment connected to the pipe line.

Look to Pittsburgh Piping and Equipment Company for leadership in methods that assure greatest safety, highest efficiency, and longest service from high temperature, high pressure piping.

Model Testing makes possible the planning of high-pressure, high temperature piping systems with accurate advance knowledge of end reactions, stresses, and strains encountered in actual operation.



Pittsburgh Piping AND EQUIPMENT COMPANY

10 Forty-Third Street — Pittsburgh, Penna.

Woolworth Building, New York
Whitehead Building, Atlanta
Bank Tower, Detroit
525 Market Street, San Francisco
Peoples Gas Building, Chicago
Public Square Building, Cleveland
10 High Street, Boston
Heights State Bank Bldg., Houston

brightness 6-7 units on the laboratory scale, using commercial Eucalypt groundwood *(I)* with yields of 97-98%. Without the acid pretreatment, increased brightness is only 3.5-4 units. The brightness both of treated and untreated *I* is markedly decreased at *p*H 5 by the following ions: aluminum, cobalt, copper, iron, lead, manganese, nickel and zinc (using milligram ion/gram dry *I*). Lesser decreases were noted with barium and calcium and only very slight decreases (1.8-2.4 units) with ammonium, sodium and potassium ions. Storage (13 weeks) caused a decrease in brightness of 1.3 units in treated and 2.4 units in untreated I. F. R. Neale, A. J. Pearson and J. L. Somerville (Australian Newsprint Mills, Ltd., Boyer, Tasmania). *Proc. Australian Pulp Paper Ind.* Tech. Assoc. 3, 24-45 (1949); discussion 45-46.

Combustion of Sulphite Waste Liquor

A problem in using sulphite waste liquor as fuel (either as powder, or in concentrated liquor form) is due to its high ash (which ranges from 7-15%) and to its sulphur content. The dried powder, which burns readily without auxiliary fuel, yields an ash which tends to deposit on heating surfaces, especially the super-heaters. When the liquor, concentrated to 50-55% solids is used, auxiliary oil or powdered coal is required, or else the surface walls cannot be cooled. These precautions are taken to maintain the necessary temperature for complete combustion. Under these conditions the ash does not adhere, and most of it can be collected in mechanical separators.

In either case (with powdered or liquid waste liquor), some sulphur trioxide is lost in the flue gases, which raises the dewpoint from 2 degrees to 40 degrees. The loss of combustible substances in the ash may perhaps be solved in the future by constructing better injecting nozzles. Bengt Brunes. *Svensk Papperstidn.* 52, 529-32 (1949). (Original in Swedish with English and German summaries.)

Offset Printing Paper

The basic operating conditions for the successful manufacture of offset paper are outlined. The stock consistency in the beater should not exceed 4.5%. Beater knives should not be thicker than 8 mm., and the bedplate bars should not be thicker than 4-5 mm. Pulp fibers should be shortened just enough to produce a paper of uniform texture. Beating should be terminated at 26-28 degrees Schopper-Riegler (deg. S.R.), and pulp passing through the jordan should have a degree S.R. not exceeding 30, at which it should enter the paper machine. To prevent "dusting" about 1% starch should be added to the pulp. To insure paper with good formation, the stock consistency should be 0.55-0.75% for paper of weight 70-100 g./sq. meter; and 0.75-1.0% for a weight of 100-160 g./sq. meter.

It is expedient to increase the orientation of fibers in the machine direction, so as to increase the dimensional stability of the sheet. In doing this, the discharge of pulp to the wire should be maintained at a somewhat lower rate than the speed of the machine. Depending on operating conditions, the shake should be held within the following limits: amplitude 3-6 mm., and frequency 200-250 shakes per minute. The temperature increment between the surface of 1 dryer and that of the next should be gradual. To reduce cockling of wet offset paper, the maximum tension should be maintained on the dryer felt. When offset paper is slit, it is always essential that the length of the finished sheet correspond with the machine direction of the paper. E. M. Berkman, *Bumazh. Prom. (U.S.S.R. Paper Ind.)* 25, No. 1, 10-14 (1950). (Original in Russian); through *Bull. Inst. Paper Chem.* 20, 887 (1950).

Two-Stage Countercurrent Pulping

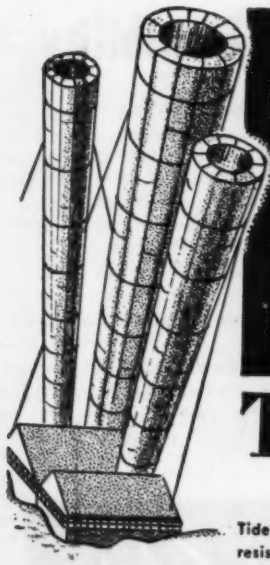
Experiments and mill operations relating to a two-stage countercurrent soda pulping system are described. In a first stage, the fresh wood is treated about ¼ hour at 170 C. with black liquor from the second stage of previous cooks; in the first stage, 85% of the caustic soda is neutralized. Liquor from the first stage is sent to the recovery system. The second stage is similar to that of a normal soda cook, but the soda is reduced in an amount equal that that neutralized initially.

Evidence (although incomplete) indicates that unbleached pulps prepared by a single- or two-stage cook show no marked differences in strength. Variables in first and second stages are fully discussed. The desirability of operating a two-stage mill system depends on economic factors. Whereas 30% caustic soda may be saved, a 50% greater steam requirement may be involved and digester volumes may have to be increased. Application has been made for an Australian patent. A. R. Slomam. (Assoc. Pulp and Paper Mills, Ltd., Burnie, Tasmania) *Proc. Australian Pulp Paper Ind. Tech. Assoc.* 3, 47-68 (1949); discussion 68-71.

Photographic Base Paper in the U.S.S.R.

Requirements of a photographic base paper are: absence of bubble formation on wetting, minimum residual deformation and shrinkage after wetting and redrying; absence of metallic particles (especially iron), and of iron salts. In the absence of a legal standard quality of water for the manufacture of photographic base paper it is recommended that the water should contain not over 0.1 milligram of iron salts per liter, be completely free from chlorine, and that sand or mud be absent. When the iron salt content is subject to seasonal variations, the water should be aerated, and pretreated to precipitate the iron (sodium hexametaphosphate may be used for this purpose).

The following pulp is suggested: a bleached sulphite containing 90-92% alphacellulose, not over 3-4% pentosans, and not over 0.2-0.3% ash. Three photomicrographs are included. I. G. Kulev. *Bumazh Prom. (The U.S.S.R. Paper Industry)* 24, No. 6, 18-21 (1949). (Original in Russian) through *Bull. Inst. Paper Chem.* 20, 887-8 (1950).



A WOOD
Naturally Resistant
TO ACIDS, ALKALIES AND DECAY

Tidewater
RED CYPRESS

Tidewater Red Cypress serves better and lasts longer. It's natural resistance to acids, alkalies, etc. insures long and satisfactory results when used in vent stacks, pickling troughs, electroplating vats, etc. It's use under these conditions truly confirms its claim to being "The Wood Eternal".

If you have a particularly perplexing problem let us help you solve it. We invite inquiries concerning all types of tanks and vats . . . fully fabricated or partially fabricated.

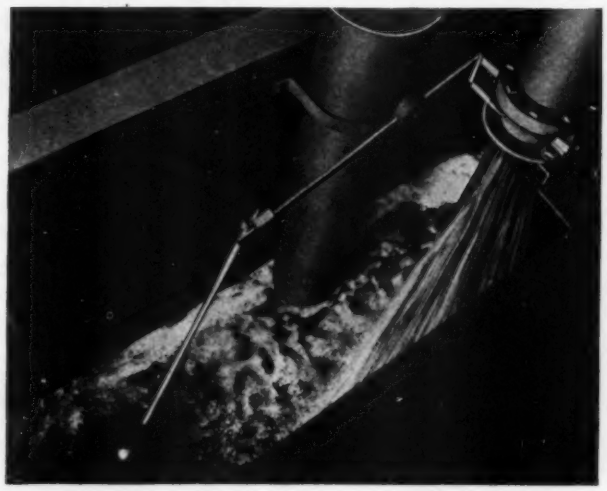
The Name Red Cypress "The Wood Eternal"

FLEISHEL LUMBER COMPANY

4234 Duncan Ave., St. Louis 19, Mo., NEwstead 2100

R-S valvEvents

• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •



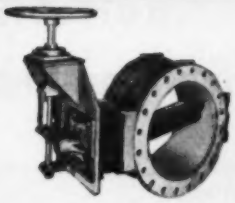
R-S FLOAT VALVE for Sewage Service

The R-S Heavy Duty Direct Action Float Valve controls the water level in a wet well of a sewage treatment plant at Quakertown, Pennsylvania. Illustration shows valve approximately 25% open. At the high level, practically drip tight shut off is obtained with metal-to-metal seat. The adjustable float connection keeps the float away from the area of turbulence.

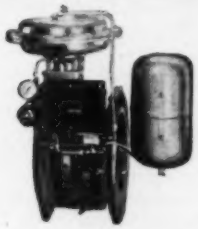
R-S Valves are used in air, gas, liquid, steam and semi-solid service for the shut off and regulation of volume and pressure, pressure relief, liquid level control, back pressure, water hammer, steam hammer, constant differential pressure, output control of pumps, fans, engines, turbines and automatic combustion. Suitable for service in the temperature range from minus 300°F to plus 2000°F. 2 to 2500 psig.

Specify R-S Valves for simplified control and shut off. Consult with your local R-S Valve Engineers or write direct.

R-S PRODUCTS CORPORATION
Wayne Junction • Philadelphia 44, Pa.



No. 700—20-inch 50-pound Cast Iron Valve with rubber seat, Type B-8934, for positive 100% shut-off. Heavy duty handwheel control with threaded reach rod. Type B-9469.



No. 781—Fourteen-inch Heavy Duty Cast Iron Valve with 125-pound American Standard flanges and drilling. Mounting bracket, crank arm, reach rod and linkage together with springless diaphragm top including positioner, gauge and an auxiliary tank as an integral part of the unit. Should all air fail, pressure in the tank will stroke the valve. Note the bronze bushings in bracket through which the air motor shaft passes.

No. 780—Eight-inch Off Center Valve for control of 15 psig saturated steam with 1 psi drop. Series 15, 150 - pound American Standard raised face flanges. Double crank arm with adjustable weights for accurate setting. Cylinder is not an actuator but simply a dash pot. Note 2-inch flanged outlet for overload relief.

No. 782—Heavy Duty Wafer Type Valve, rubber seated, 5° angle seated vane with enclosed gear reduction drive. Note that there is plenty of room to easily remove the gland and repack the stuffing box.

Convention Papers . . . Abridged

Portable chipper in woods operation*

C. G. McLAREN[1]
and
MARLOW P. BURGY[2]

The portable pulpwood chipper, as developed by National Container Corp. of Wisconsin, was designed to accomplish a four-fold purpose: to chip hardwood pulpwood in the woods for our semichemical plant; to chip slabs, cull lumber and veneer cores on landings; to chip rough wood at either portable tie mills or veneer mills; and to chip rough wood at sidings where in such form transportation to the pulp mill would be uneconomical.

The fulfillment of this four-fold purpose not only eliminates storage difficulties at the mill but also permits closer wood utilization in the woods.

The chipper is a special 60 in. 10 knife J. D. Murray unit with chip blowing arrangement on the disc. The maximum size of round wood that it will handle is around 11 in., depending on the crooks and knots on a stick. The actual throat opening is 12½ in.

The engine is a model 12104 twin six General Motors Diesel which develops 290 hp. at 1600 rpm or 235 hp. at 1200 rpm. The chipper and engine are enclosed in a steel-plate house to protect them from the weather.

The drive consists of 14 V-belts with a 13.5 in. pulley on the engine and a 42 in. flywheel pulley on the chipper.

The pulpwood rack superstructure was designed and built by National Container Corp. to facilitate the feeding of the chipper. As constructed and operated it almost eliminates the necessity of manual lifting of the pulpwood. The chipper, engine, house and superstructure are mounted on a structural steel base with steel plate on the bottom.

The complete machine, with the exception of the pulpwood rack superstructure, was manufactured by the D. J. Murray Manufacturing Co. of Wausau, Wis., from specifications submitted to them by National Container Corp.

The entire unit weighs approximately 35,000 lb. Mounted on a semi-trailer, it is moved readily from landing to landing on strip roads in the woods.

The semi-trailer chip conveyor trucks have a capacity of approximately 15 tons of chips. A chain conveyor in the bottom of each truck unloads the chips to the rear. The truck bodies were manufactured by the Baughman Manufacturing Co., Jerseyville, Ill.

In woods operation each pulpwood landing is laid out to handle around 30 to 50 cords of wood. They also are so placed that the chipper, trucks and crane have sufficient space in which to operate. The wood is cut to a one in. top and 100 in. length by piece-cutters, paid on a cord basis.

In a chipping operation, the chipper unit is spotted beside a pulpwood pile in such a manner as to permit a chip conveyor truck to be spotted underneath the chip blower spout cyclone. A 10-B Bucyrus-Erie swamp-type ⅜-yard crane with a five cubic ft. Williams bucket lifts the wood from the ground onto the top of the chipper unit.

The man who feeds the chipper takes the place of the toploader; no man-power other than that used in ordinary hauling operations is required to operate the chipper. The 10-B crane, however, is capable of handling around 25 to 30 cords per hour, while the chipper will not handle more than 15 to 20 cords. In fact, at no time is there need for more than 150 tons of chips per day. This tonnage means only about 75 cords; the potential capacity of the chipper is two or three times that amount.

The chipper operator stands on a catwalk along the rack and feeds the sticks into the spout of the chipper. In handling the sticks he rolls and up-ends them and lets them fall into the spout by gravity. The chips so produced are blown into a chip conveyor truck by the chip blowing arrangement on the disc of the chipper. From 20 to 30 minutes are required per load.

The chips are hauled to the mill at Tomahawk, Wis. There they are unloaded into a hopper which feeds into the mill conveyor system.

To unload a truck the chain conveyor in the truck body is placed in operation. This operation is accomplished by connecting it to a stationary electric motor and then starting motor. The unloading time for a truck is about ten minutes.

Some advantages of this type of operation are:

1. Utilization: In our woods operation, four cords out of every ten produced are below merchantable size. Under present methods of producing pulpwood, these four cords would be left in the woods.

2. It eliminates handling and storage in the wood yard.

3. The flexibility of the unit permits its use in the mill, if necessary, to supplement or temporarily replace stationary chippers.

4. Due to the close utilization, very little slash is left in the woods. What slash remains decomposes rapidly.

5. The close utilization will make it possible for our plant to be self-sufficient in the use of popple and other hardwoods without resorting to rail shipments. The additional 20 to 25% volume off the ground will cause the immediate area to produce that much more chips, thereby relieving us of the necessity of going out on rail for hardwood pulpwood for semichemical use. The minimum rail haul cost, if gotten beyond a fifty-mile truck haul, would be about $3.75 per cord—using the average hardwood as weighing 5,200 lb. The additional 20 to 25% of chips on trucks, recalling four cords out of ten being left in the woods under present methods of producing pulpwood, therefore, means considerable savings per ton of board produced.

Some disadvantages of this type of operation are:

1. Requires greater capital investment.
2. Necessary to have good woods-roads.
3. Not adapted to production of bark free chips.

(*) Abridged from a paper read before the 31st annual convention of The American Pulp and Paper Mill Superintendents' Association, Inc., held at the Edgewater Beach hotel, June 8-10.

(1) Vice President and General Manager, and (2) Forester, National Container Corp. of Wisconsin, Tomahawk, Wis.

The problem of curl*

AUGUST S. ERSPAMER[1]
and
WILLIAM D. RICE[2]

If a papermaker were asked the question "What is curl?" his reply might be that it is the term associated with the behavior of paper in not lying flat. Such an answer would be true, but is it adequate? What are the answers to "how and why?"

These questions are not simply answered; and perhaps a review of the various types of curl is advisable.

First to be considered is a most familiar kind; namely, moisture curl. If one side of a piece of paper is moistened the paper will curl away from the wetted side, due to the expansion of fibers upon the absorption of water. This behavior is of value as a quick test for machine direction, the axis of curl being in that direction because of the nature of fiber expansion and existence of grain in paper.

Paper fibers, upon absorption of water, expand much more across than in their lengths, the change amounting to about 30% in diameter as compared to 1 or 2% in length. (Reed, R. F., "Curling of Lithographic Papers," 1st ed. *Technical Bulletin No. 7*, New York, N.Y., Lithographic Technical Foundation, Inc., June, 1946) Moreover, all machine-made papers exhibit to some extent a grain or fiber alignment in machine direction.

Basically speaking, the latter is caused by a combination of effects on the paper machine. Contact with and friction from the traveling wire cause an alignment of fibers in the machine direction. This effect is partially offset by the shake. In addition, the nature of stock entry onto the wire, stock consistency, and drainage rate, as well as speed of wire travel and extent of shake, exert influences upon the balance in fiber alignments during forming of the sheet. Grain is further accentuated by pressures and tensions in later operations on the machine. Restrained shrinkage in the machine direction during drying causes the greatest of these. Tensions resulting from the action of dryers and dryer felts against the sheet tend to pull more fibers into grain alignment.

(*) Abridged from a paper read before the May 5-6 meeting of the Pennsylvania-New Jersey-Delaware Division of The American Pulp and Paper Mill Superintendents Association, Inc., held at the Yorktowne Hotel, York, Pa.

(1) Technical Director, and (2) Chemical Engineer, P. H. Glatfelter Co., Spring Grove, Pa.

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

The large photo shows a Universal type Container being transported at the Celanese "Celriver" plant, while two small photos show how a special 10 cu. yd. container is lowered and placed in loading position under bin. Dempster-Dumpster then moves on to service another container. Both type containers have drop bottom dumping action, and are emptied automatically from hydraulic controls in truck cab.

*Reg. U. S. Pat. Off.

Celanese* – recognized across the nation

- TEXTILES
- PLASTICS
- CHEMICALS

. . . Celanese Corporation of America, well known for sound management, uses the Dempster-Dumpster System at its "Celriver", Rock Hill, S. C. yarn plant

Celanese Corporation of America is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

This system consists, basically, of one Dempster-Dumpster and any number of detachable Dempster-Dumpster Containers, which are spotted at convenient materials accumulation points inside and outside plants. With only one man, the driver, the Dempster-Dumpster picks up, hauls and dumps (or sets load down intact) one pre-loaded container after another. The capacities of the larger Dempster-Dumpster Containers are equal to and greater than regular dump truck bodies, and they are available in a wide variety of designs each suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. In some installations one Dempster-Dumpster handles as many as 100 or more containers—increasing man-power efficiency . . . reducing investment and maintenance costs . . . improving "housekeeping" methods . . . reducing fire hazards . . . and providing an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS, 7100 Dempster Building, Knoxville 17, Tennessee

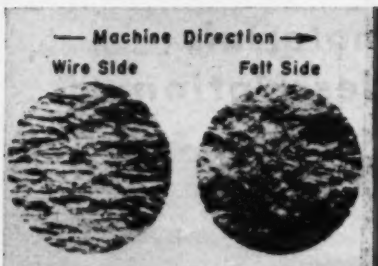


Fig. 1. Two-sidedness of Paper

Fig. 2. Moisture or Humidity Curl

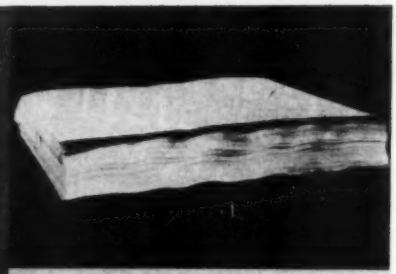


Fig. 3. Wavy-edged Paper

The existence of grain together with the differential nature of fiber expansion therefore causes a curling with axis in machine direction when one side of a piece of paper is moistened.

First of all, the sheet as formed on the paper machine has a bottom or wire side and a top or so-called felt side. Contact of the bottom side with the wire during drainage exerts greater restraint on fiber motion in and near that surface of contact. Conversely, there is a more random distribution of fibers in the top side. Due to nature of drainage, less fiber fines and filler are retained in the wire side. The net result is a two-sided sheet with a more pronounced grain on its wire side as shown in Figure 1. This condition gives rise in one manner or another to most conditions of curl commonly experienced.

To best describe moisture or humidity curl, one should consider only the behavior of paper which is flat when it leaves the machine or layboy. If there is significant moisture pick-up by the sheet thereafter, the moisture curling of the sheet will be toward the felt side with axis in the machine direction, Figure 2(a). The moisture increase responsible will most frequently result from exposure of the paper at a relative humidity higher than that with which it is in equilibrium. If the paper is on a skid, only the top sheets and outer edges will pick up moisture, resulting in wavy edges as in Figure 3. The greatest effect noticeable here is along the cross-grain edges.

Paper which loses moisture, because of contraction or shrinkage of fibers and two-sided grain, will exhibit curl toward wire side, axis in machine direction, Figure 2(c). In skids, where both moisture loss and sheet freedom are restricted, the result will be a tight-edged or baggy load, Figure 4.

The extent of these various effects is most pronounced in the "harder" papers—such as bond, writing, and offset grades, and least noticeable or troublesome in the "softer" grades—such as bulky book or absorbent papers.

This is perhaps most simply explained by comparison of the general characteristics of such sheets, the former being well-hydrated, hard-sized, stiff or "rattly" papers, and the latter just the opposite. In expansion or contraction with moisture change, the effect of individual fiber change upon over-all sheet behavior is logically far more pronounced in a "hard" than in a "soft" paper. This, it is safe to say, will be the case whatever type of curl may be considered.

Papermakers should be most familiar with the various kinds of inherent curl, the type which usually is "built into" paper during manufacture through faulty operations or inadequate control. The drying process is perhaps the greatest source of both cause and cure.

Specific attention should be drawn to some of the things which happen in the machine drying of paper. First of all, just as paper fibers expand with moisture gain, so do they contract or shrink in drying.

Since paper as sheeted on a layboy usually is stacked on skid with wire side up, the result would be a load of paper as shown in Figure 5, the axis of curl lying in the cross-machine direction. It may be considered that tensions applied lengthwise of the running web are retained until the paper is sheeted. Since the wire side has a more pronounced grain, the amount of stress is somewhat greater on that side, and stress relaxation or relief results in a tendency to curl in that direction, i.e., cross-grain edge curl to wire side.

The most frequent and perhaps worst type of inherent curl set up in the drying operation is that of a grain edge curl to wire side as in Figure 6. In this case, the axis of curl is parallel to machine direction. This should not be confused with a similar looking humidity curl occasioned by a drying out of the paper. This inherent curl is decidedly a result of two-sided shrinkage across the web as it is dried.

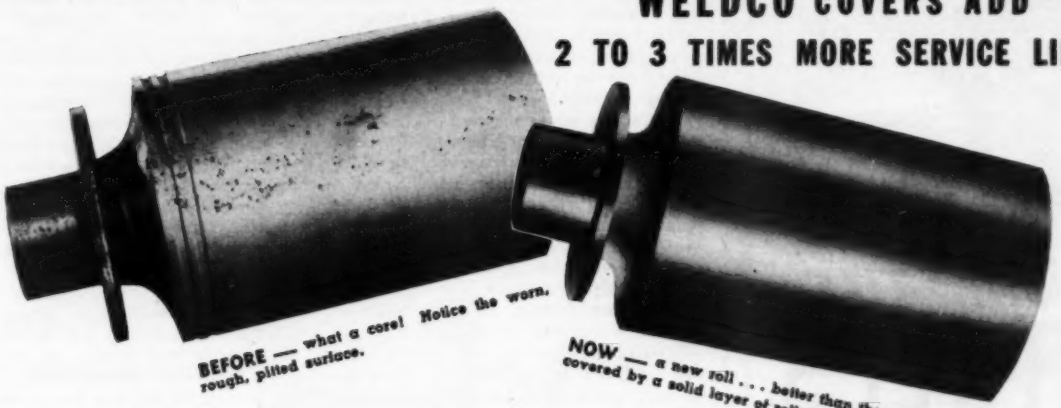
Such curl can cause trouble in several ways. When detected in the mill, it may be difficult to eliminate or correct. If there is also moisture pick-up, the curl therefrom may offset the inherent curl. In such case, the paper will lie flat until, perhaps in the user's shop, conditions are varied; then, curl finally appears. At that point, both identification and correction may be elusive, and complaints arise.

While considering inherent curl, certain other possibilities should not be overlooked. Cross-grain edge curl may be induced in several ways other than earlier described. One such could be the combined pressures and felting actions at the press sections. (Hanson, H.H., "Curling of Paper," Paper Mill Wood News 57, No. 43: 5, 16-17, Oct. 27, 1934) Calendering may produce such curl if one side of the paper is wetter than the other, two-sided expansion under pressure giving rise to curl toward the dryer side of the sheet. Paper which has been reeled too tightly or cut from too near the core may exhibit curl toward the side reeled in. Another permanent curl, not necessarily cross-grain edge, may be caused by improper storage. For example: If paper is packed too

ENGLISH ECCO CLAYS TRADE MARK CLAYS
UNIFORM • SUPERIOR • DEPENDABLE
English China Clays Sales Corporation
551 Fifth Avenue, New York City

NEW LIFE FOR AN OLD ROLL

WELDCO COVERS ADD 2 TO 3 TIMES MORE SERVICE LIFE!



BEFORE — what a core! Notice the worn, rough, pitted surface.

NOW — a new roll . . . better than the original . . . covered by a solid layer of rolled metal!

The Weldco covering process can be used for both new and reclaimed rolls, eliminating the cost of new cores and providing substantial savings. Available in Monel, Stainless Steel, Nickel and other alloys, Weldco Rolls resist corrosion, withstand abrasion, and give long, economical service.

Investigate this patented process that provides a solid layer of rolled metal, applied to the base roll uniformly and tightly. Let Weldco roll specialists advise you on the best materials for your roll and processing requirements.

THE YOUNGSTOWN WELDING & ENGINEERING COMPANY

3700 OAKWOOD AVENUE . . . . YOUNGSTOWN 9, OHIO

loosely in case or crate, then stored on end, it may develop this curl along the bottom edge, due to the pressure of its own weight.

To avoid complication, no consideration thus far has been given to coated paper effects. However, it should be mentioned, at least, that since coatings have properties of expansion and contraction all their own, there are an increased number of variables which may either minimize or accentuate the curling tendencies of the coated paper.

A complete classification should include that which the printer calls structural curl. It generally is known that a piece of paper will curl if drawn across a sharp edge or corner. In this process, part of the fiber bonds actually are broken; and the effect is permanent. Of course, this curl can be offset by "breaking" toward the other side in similar manner, but some damage to the sheet will remain. This can occur in printing practice if the ink is too tacky, damage resulting when the sheet is pulled from the plate or cylinder.

The printer also classifies as structural curl, the effect of uneven stress relief resulting from over-moistening of one side of the sheet by printing operations.

Thus far an attempt has been made to outline and define curl in its many possible forms. The purpose is not complete, however, unless consideration is given to what might be done to correct, or better still, prevent it.

First, it is recognized that the harder and more dense a paper may be, the greater is its tendency to curl. It is of advantage to keep refining or like treatment to a minimum. This of course is a limited tool. Furnish variation is considered to have effects related to the above. Further consideration would be complex and is left to individual thinking.

Passing along the paper machine, it should be recognized that any practical means for minimizing two-sidedness will enhance the prevention of curl. Much has been done to improve stock inlets; and many answers and solutions have been offered in recent years with varying measure of success. Efforts are aimed, most properly, toward even distribution of flow and an entrant velocity of stock onto the wire as near to wire speed as possible. A uniform caliper and a minimum of roll or drag also are important.

The machine shake may be of importance for the desired matting of fibers, and this latter is further aided by the lowest practical consistency of oncoming stock suspension. It should be noted here that the printer may want grain in the paper, the better to handle normal expansion versus press register. (Weber, C. G., "Relation of Paper Properties to Register in Offset Lithography," *Paper Trade Journal*, 18, 430-2,

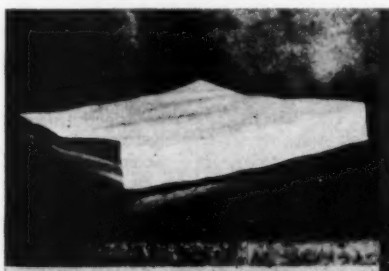


Fig. 4. Tight-edged Paper

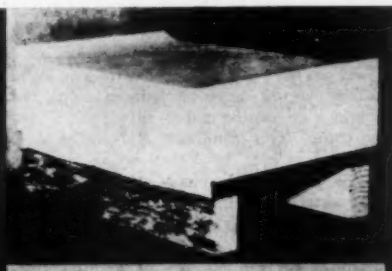


Fig. 5. Inherent Curl: Cross-grain Edge

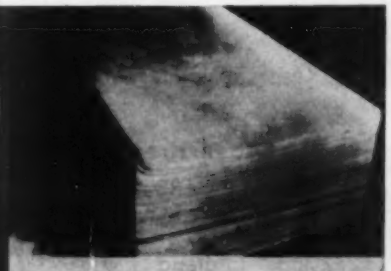
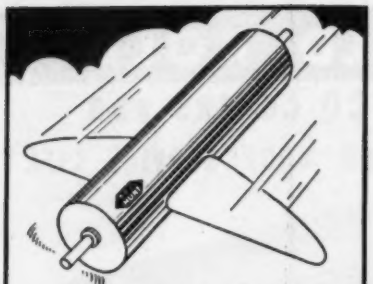


Fig. 6. Inherent Curl: Grain Edge



FAST DELIVERY ON "SHAF-TITE" ROLLS

FOR WET FELTS

plus patented features that give greater value.

Write for Catalog!

RODNEY HUNT MACHINE COMPANY

38 Maple Street, Orange, Mass., U.S.A.

For effective advertising to the world's paper users—use the—

★PAPERMAKERS'

& Merchants'

DIRECTORY

of All Nations

Reserve your space now. Full details from the Advertisement Manager, 180 Fleet St., London, E.C. 4 England

1950; *Tech. Assn. Papers* 18, No. 1, 430-2, 1935). This requirement need not be disturbing, for at this point the major problem of curl is two-sidedness.

Press roll crown should be such as to assist in greatest uniformity of drying, yet crushing must be avoided. Press felts if too wet, plugged, or worn can do much harm, causing uneven web moisture or crushing.

Upon leaving the wet end, the worst problems may be encountered—for the drying operation is a great offender. First considered were the characteristics of moisture or humidity curl, and these in the authors' experience are related most frequently to insufficient moisture left in the paper. It might be though that a reasonable amount of moisture is kept in the paper, but how often might the upper limit be 4, 5 or even 6% as final moisture content. As mentioned earlier, the printer may desire as much as 8% and be justified therein, since such condition can greatly reduce the effects of humidity and moisture in his plant and operations. Whenever the manufacturer is able to gratify this need, he profits from customer satisfaction and good will.

The steps toward solution of this problem will be closely related to those required for minimization of dryer-induced inherent curl, and may be considered as follows:

Over-drying, not only in terms of final moisture content but at every tep in the drying operation, should be avoided. The picking or fuzzing trouble encountered on the first several dryers, if their temperatures are too high, is familiar to all papermakers. It also should be noted that excessive temperatures in any dryer may accentuate the development of stress in the paper. Graduated drying (Callan, John G., "Controlling Causes of Problems in Paper Drying," *Paper Mill* 60, No. 24:18-20, June 12, 1937; Rasmussen, C. F., "Gradual Temperatures in Paper Drying," *Tech. Assn. Papers* 13, 100-5, 1930), at least through part of the system, and the lowest practical maximum drier temperature, are advised.

Uniformity of dryer-to-dryer temperatures is considered to be important. Inherent grain-edge curl can be induced or increased by unbalance in temperatures between the upper and lower tiers and dryers. Gradual and fairly even drying of the paper should afford most freedom from stress curl (Strachan, James, "Automatic Control of Paper Drying," *Paper-Maker* 93, No. 5: Ts 65-7, May 1, 1937).

The existence of variations in dryer surface temperatures either across or around the cylinder may be a definite factor in causing non-uniform moisture content and stresses within the paper. There also are the effects of non-uniform, incomplete, or otherwise poor felt drying, and of pocketing of humid air in the spaces bounded by driers, felts, and paper.

It has been observed that curling in some cases may be more pronounced along the back edge of the paper as viewed cross-machine: This condition is believed due, at least in part, to higher drying temperatures nearest to points of steam entry into the driers. Misalignment of parts of the drier sections may give similar effect.

Many methods and devices have been developed for the purpose of drying-versus-moisture control. All seem to aim at uniformity and efficiency of drying, certainly the desirable goals. The effectiveness and relative merits of the various systems seem debatable. At any rate, it is doubtful that any such system affords complete solution.

The importance of proper maintenance of syphons, condensate, and vacuum systems, etc., in enabling efficient and uniform dryer performance is known. The presence of scale inside the dryer shell or pitting of the dryer surface certainly may contribute to inefficiency and non-uniformity. Even distribution of steam throughout the dryer should be of importance. In this latter respect, most recent developments make use of annular inserts or double-walled construction to attain most direct contact of steam, at high velocity, along and against the outer shell of the drier.

Once past the dryer section, it becomes important to avoid further drying of the sheet. Moisture content may be ideal as the sheet leaves that section, yet because of paper temperature and further heating from calendering friction, may be too low in the reel. Cooling of the sheet is advisable to minimize this possibility; and the omission of steam from the last drier is of possible advantage. Use is made of chilling rolls, water or air-cooled calender rolls, and water-cooled reeling drums, these devices being helpful so long as additional stresses are not induced thereby. In such applications, precautions against rusting are necessary.

The danger of calender blackening, which limits the amount of moisture permissible in the sheet, frequently is related to prior non-uniformities of bulk moisture. Such conditions should be overcome in the forming or drying operation, whichever is responsible.

The use of various external devices for moisture addition or conditioning seems to be receiving increased interest and consideration. Such equipment should be viewed as last resorts; however, it being more desirable to retain moisture than to replace it.

In conclusion, it is recognized that the problem is extensive and certainly varied among papermakers' experiences. It is hoped that the observations which have been presented will be of value through stimulation of a more concerted attack upon the problem.

The part played by a superintendent in personnel relations*

A. S. ANDERSON
Champion Paper and Fibre Co.

Personnel relations is concerned with the proper utilization of human resources; and human resources include those things that human beings can do.

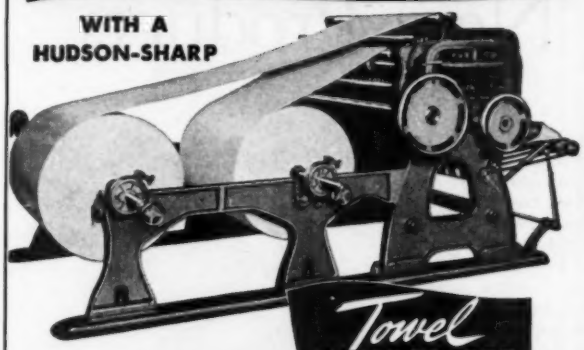
It may be lifting a load of paper onto a trimmer. Perhaps it is sitting at a desk and figuring out what it costs to make a ton of paper. It may be making plans and getting somebody else to do a reasonable day's work, whether it be lifting or figuring, or both.

The last describes the superintendent's job. Since we are concerned with the superintendent today, let's concentrate on him. He is a very busy man. He, too, must depend on a man (a number of them for different things, of course).

(*) Abridged from a paper read before the 31st annual convention of The American Pulp and Paper Mill Superintendents Association, Inc., held at the Edgewater Beach hotel, Chicago, June 8-10.

COINCIDE *peak* PRODUCTION

WITH A HUDSON-SHARP



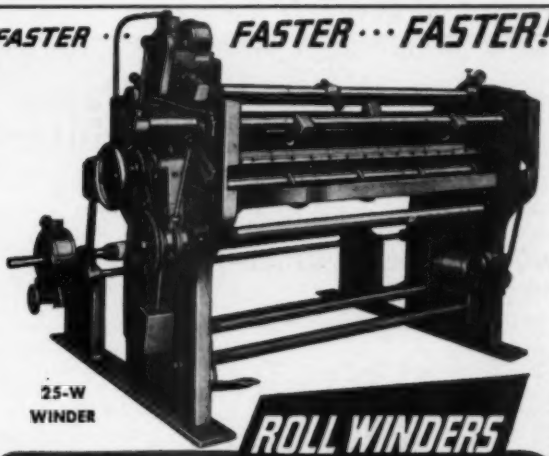
Towel INTERFOLDER

BUILDERS of folders and interfolders for the paper towel industry since the product was originated, Hudson-Sharp machines have been improved and redesigned to meet the increased production speeds required for post-war demands. Write for complete information today.

HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS

FASTER · · · FASTER · · · FASTER!



25-W WINDER

ROLL WINDERS

A new, high speed slitter and rewinder for converters of locker paper, shelving paper, household wax rolls, and paper and cellophane gift wraps. Produces perfect rolls with increased production and lower maintenance costs. Write for complete information.

HUDSON-SHARP

MACHINE CO • GREEN BAY • WIS

Who is the man he depends on to get and keep good personnel relations? It is the foremen, each and every one of them.

How does the foreman get and keep good personnel relations? First, it seems to me, he has to understand what constitutes the areas in which he works. With this understanding, he can know what he is trying to do and how to go about it.

The generally accepted areas in which we work to get and keep good personnel relations are employment, safety, wages and benefits, leisure time activities, and training and development.

You do have to have men when you need them. The ideal, of course, is just the right man for the right job. If the operation is of sufficient size, it is worthwhile to have a man whose job it is to screen out the obviously unfit, to know where to get a man when the need arises, to be sure that he is physically able to do the job and if you don't need him in one department to see that arrangements are made to transfer him to another. Whether you as superintendent do all the hiring, transferring and firing, whether your foremen do it or whether you have an employment manager do it, it all adds up to the same thing, it is personnel relations; and, if it is done well, as it should be, it is the very foundation of good personnel relations.

Safety or accident prevention is a more important area than many of us seem to believe. If you have had occasion to see the accident frequency for the paper and pulp industry, you will note it is not good. Safety is a tough subject to arouse enthusiasm about, but good accident prevention is appreciated by the employees who are exposed to the industry hazards. A good accident prevention program is part of the job of creating good personnel relations.

In addition to being employed and working safely, we also are interested in what we get paid. Maybe the superintendent sets rates of pay; maybe the foreman; maybe it's the timekeeper or paymaster. Nevertheless, somebody has got to keep on top of wages, government regulations as to overtime, insurance coverages. Whoever it is, is working in the field of personnel relations.

Surprising as it may seem, numerous surveys have shown that the money paid as wages is well down the list in the order of what employees have expressed as being of most interest to them about their job.

"Man doth not live by bread alone," brings us to leisure time activities. Many of you will say, "What has a baseball team or a bunch of the boys bowling or serving as board members on a credit union got to do with making paper?"

These things and many more are outside of working hours. So it may honestly be questioned whether it has anything to do with making paper. It most certainly does; and here is why! You yourself know how much better you work when you really feel like it.

Naturally, we can say, and many times do, "We pay good wages, and the only thing we owe the employee is the amount of money he earns for the hours he works." But common sense must tell us that what he produces in those hours is what we are most concerned about. The trick is to get each and everyone to feel like doing a good job.

Good personnel relations create the climate wherein men feel like doing a good job. What a man does in his leisure time has a definite bearing on how much he feels like working and doing a good job.

It pays for a company to take a healthy interest in its employees' leisure time activities. This doesn't mean that the company should take over the whole responsibility or try to tell each employee how to live every minute of his life.

To my way of thinking, the most important phase of getting and keeping good personnel relations is in the area we term training and development.

Here is where the superintendent can get most when he faces up to his real job of making plans and getting every employee under his supervision to do a reasonable day's work.

Many of you superintendents started as young men in the paper mill and remember well what you went through. You made the grade; but how many have you seen start in the mill as young men, good young men, that didn't stay, but went some place else. It costs money to start young men; and, while it takes time to train them in the right way, it saves money in the long run.

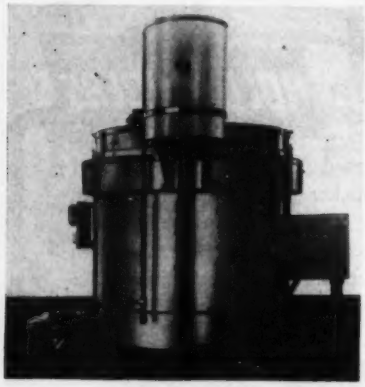
In addition to a simple starting job, there are advanced or higher paying jobs ahead that many good young men aspire to. It pays to think and plan ways to help them prepare for future openings. Most of the

(Turn to page 780)

The Paper Industry New Products

White Water Clarifiner and Recovery System

Unaffected by rapid changes in flow rate.

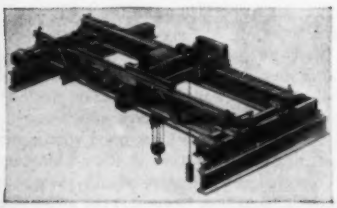


The "Bird-Gibbs Clarifiner" operates on fourdrinier machine white water, cylinder machine white water, mill waste water, board mill combined waste water, and deinking plant waste water. It removes the suspensions of fiber, filler or other matter and returns reusable stock and clear water.

The principle of the "Clarifiner" is in the fact that it generates billions of tiny air bubbles, distributes them in volumes sufficient for the volume of white water or waste water being handled, and utilizes them to float the particles suspended in the water. Solids of any nature are lifted to the surface by these bubbles and skimmed off and removed continuously. The machine is said to remove 98 to 99 per cent of total suspended solids in white water of 25 pounds of fibre per thousand gallons, and 96 per cent of solids in deinking waste. Operation is automatic. The "Clarifiner" is built in a number of sizes. Bird Machine Co., South Walpole, Mass.

Cranes

Designed for intermittent duty.



This new overhead-traveling crane, to be known as E-type Cranes, is available at lower costs because of an engineering design which makes use of stock parts and other components which can be built in quantity and assembled without individual engineering. They are built in capacities ranging up to 12 tons, and spans from 20 to 60 feet. Bridge or trolley may be supplied without motors for handpower operation, or the crane may be supplied with cab control. The E-type Cranes have fluid drive and magnetic control. Their design permits higher lift of the hoist by keeping down headroom requirements, and features a rigid bridge and streamlined design to eliminate useless weight. Whiting Corporation, Harvey, Illinois.

Automatic Adhesive Control System

Makes possible up to 60% saving on adhesive costs.

This new machine, called the Visco-Mat, maintains a constant check on the desired and precontrolled viscosity setting by feeding the dehydrated adhesive powder into solution, and blending it with water, which is automatically fed in necessary proportions. By means of a set of visual signals, the adhesive never becomes too thick or too thin. A simple handsetting control dial makes the end ready-to-use adhesive product to whatever consistency the user requires. As the adhesive is withdrawn for use, the machine automatically replenishes the liquid adhesive supply from its reservoir. This reservoir can be established, depending upon the requirements of the user, from several gallons up to a capacity of 100 gallons. Triangle Package Machinery Co., 6633 W. Diversey Ave., Chicago 35, Ill.

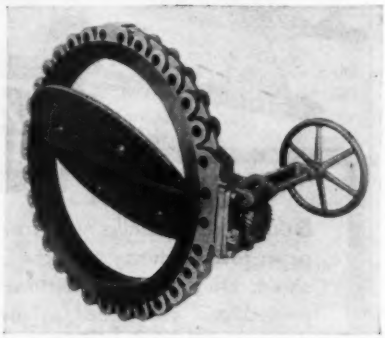
Floor Resurfacer

Eliminates hazards of broken floors.

The improved ARMOR Floor Resurfacer bonds perfectly to old concrete floors and can be laid as thin as ½ inch over the present base. It will not shrink or break its bond, and will set up overnight and can be used within 24 hours or less if necessary. Tests prove it to be four times stronger than ordinary concrete. ARMOR is primarily used in plants where a combination of constant dampness and acids have been found to have no effect on the ARMOR floor. The cost is actually less than that of concrete per year of service. The Monroe Co., Inc., Dept. 9#2, 10703 Quebec Ave., Cleveland 6, Ohio.

Wafer-Type Valves

Designed to resist torque.



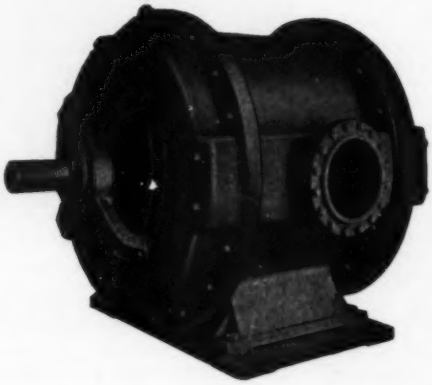
These new one-piece body cating valves, designated as No. 771, have many of the rugged features of the standard double-flanged units. Vane, shaft assembly, handwheel control with self-locking worm and gear and flareout on body casting which accommodates the large mounting bracket are identical with double flanged valves. Pressure drop is low and therefore they show substantial savings in pumping power. There are no pockets to capture sediment, and no change of flow direction to create turbulence. R-S Products Corp., Wayne Junction, Philadelphia 44, Pa.

Industrial Glove

Roughened surface insures tight grip.

This new industrial rubber glove, called *Griprite* is made with a roughened surface that insures a firm tight grip, even in the wettest application, allowing work under these conditions to be accomplished with ease and speed. The glove enables the wearer to grip the smallest objects firmly. It has curved fingers, and is 14 inches long. It comes in sizes 9, 10 and 11 in black. Some of the advantages of the glove are its uniform strength, excellent snag and tear resistance, and its high flexibilty. The B. F. Goodrich Co., Akron, Ohio.

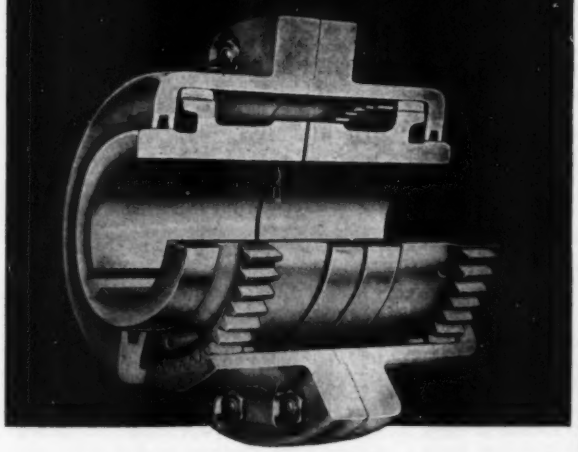
ONLY NASH VACUUM PUMPS HAVE ALL THESE FEATURES



One Moving Element. Non-pulsating Vacuum. No Internal Wearing Parts. No Internal Lubrication. Handles Liquid With Air. No Expert Attendance. Constant Efficiency. Low Maintenance Cost.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

POOLE

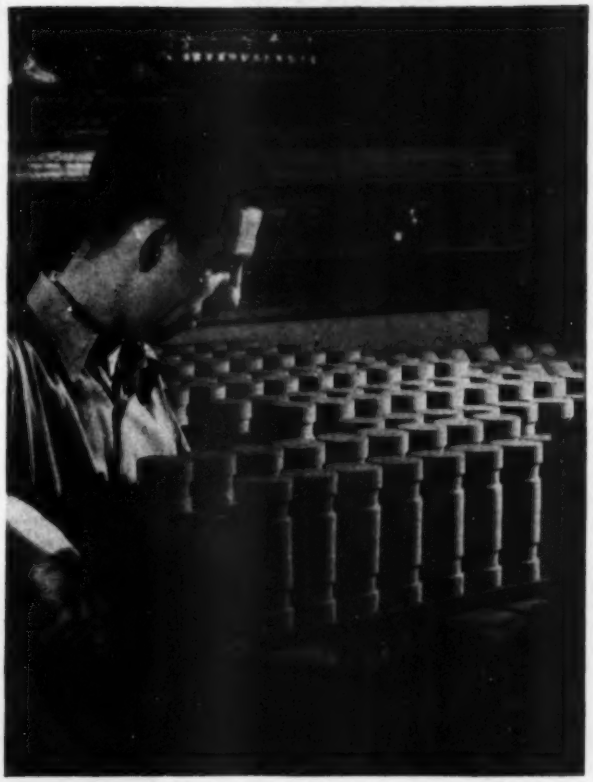


A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

THIRD OF A SERIES



"K" ON A FITTING
MEANS
FINE WORKMANSHIP

When you examine a "K" fitting closely, the high standard of workmanship speaks for itself.

This excellence in "K" fittings is directly traceable to exacting analysis of the melt, to the very latest in core-making and foundry equipment, to the care exercised in machining—and perhaps most important of all—to close control at every stage of the operation.

For instance: So close is the mechanized foundry control that less than an hour elapses from the time the mold is made until the fitting is finished and inspected—enabling the inspector to check quickly the molding operation should anything wrong show up.

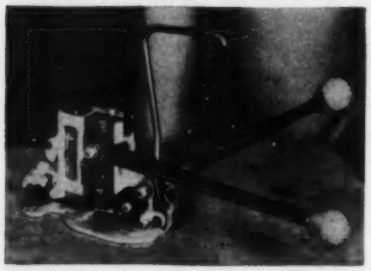
For better than 60 years "K" on a fitting has stood for quality—assurance that fittings bearing that trade-mark will make up fast, pull tight and deliver satisfaction.

THE KUHNS BROTHERS CO.
1818 McCALL STREET
DAYTON 1, OHIO
Established 1887

K CAST-IRON FITTINGS
3,000 SHAPES AND SIZES

Steel Strapping Tool

No strapping waste—cut off is practically flush with end of seal.



This new tool, the model A-34, which is the lightest ever built for ¾-inch strapping, weighs only 15 lb. In smooth, continuous sequence, it tensions and cuts the strapping, automatically feeds the seal and crimps it to complete the operation. The seal magazine is designed for quick loading and holds a clip of 75 seals. The A-34 can be released at any point in its operating cycle to relocate the strap. Because of its design, straps can be tensioned to full strength, and it can accommodate a suspending hook, which makes it possible to operate the tool from a natural position on the sides of high skids or containers. Signode Steel Strapping Co., 2608 N. Western Ave., Chicago, Ill.

Industrial Pail

Said to be practically indestructible.

This new three-gallon chemical pail is made of a tough, resilient, high-styrene, co-polymer rubber that provides an excellent combination of lightweight, corrosion resistance and strength. It will not chip or crack, and because chemicals cannot penetrate the impervious surface the pail is easy to clean. Its pouring spout eliminates costly and dangerous drip and keeps corrosive chemicals from running down the sides of the pail. This spout makes it possible to pour directly into narrow-necked vessels. Both rim and bottom of this pail are specially reinforced for extra strength. The handle, made of another high-styrene, co-polymer rubber, is shaped to fit the hand. An easy-to-read scale on the inside of the pail is marked off in half-gallons. American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.

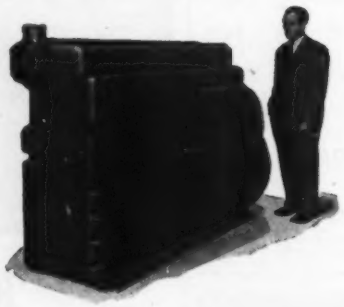
Pinch Valve

Resistant to corrosive or abrasive materials.

This new rubber pinch valve absorbs vibration, eliminates water hammer, and affords a positive seal in the closed position. It will outwear metal when used in corrosive carrying pipelines, and its metal parts can be refitted to new valve bodies, reducing replacement costs. The valve is compactly designed, with mechanism, retaining rings and pinch valve body in one unit. U. S. Rubber Co., Rockefeller Center, New York 20, N. Y.

Heavy-Duty Diesel Engine

Powerful—but portable.



A new diesel engine, designated as the TS diesel, incorporates many new design features. It can easily be made portable, it is small in size, light in weight, powerful, and perfectly balanced. It is a four-cycle, 7-in. bore, 8½-in. stroke, single-acting engine with a weight of about 30 lb. per hp., and a fuel consumption of .40 lb. per hp-hour. The TS diesel is now available in 6 or 8 inch-line cylinder designs, capable of delivering 195 to 375 hp. at 900 to 1,000 rpm. Among the many new features are cylinders which are provided with replaceable, wet-type liners and individual heads with overhead valves and intake and exhaust valve-seat inserts. Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

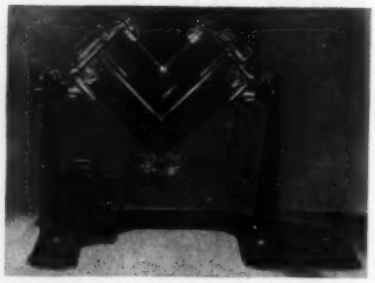
Automatic Pump Control

No special design of pumping station necessary.

The new "Pressureflo" control consists of a flow-determining means, a pressure or level sensing device and a mechanism to translate this information into a control function. Other equipment consists of standard components plus a special control device to convert flow and pressure into pump response. It may be used to start and stop pumps, to increase or decrease the speed of one or more pumps, to maintain a predetermined pressure at any point or district on a distribution system, or to automatically adjust both pressure and flow to suit varying demands. Builders-Providence, Inc., 345 Harris Ave., Providence 1, R.I.

Twin Shell Blender

For use in testing or small production service.



Two sizes of these new Twin Shell Blenders are available—4 and 8 quarts capacity—mounted on an adjustable base which has an extendible frame. The Blender Shell is made of heavy transparent plastic, but other materials are available for construction of the Shell. Extra blender shells are available for use where danger of contamination would necessitate fresh blenders each time. The charge and discharge connections have covers pivoted on one side for quick opening and closing. The assembly includes a 1/20-hp. GE-gearhead-type motor, sealed ball bearings, and chain and sprocket drive to produce 32 rpm. The Patterson-Kelley Co., Inc., 44 Burson St., East Stroudsburg, Pa.

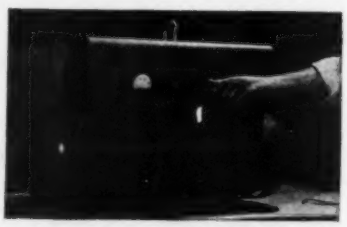
Tilter

Designed to prevent accidents.

The new GS tilter for five gallon bottles provides a safe and easy method of pouring liquids into smaller containers. Built on scientific lines, it is designed to prevent accidents caused by spilling, splashing and carelessness in pouring liquids. A chain is provided to hold the bottle in position when tilted. The cradle is made of steel, and all members are riveted or welded, insuring a strong and durable device. General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa.

Charging Equipment

Has more than 2,000 available adjustments of charging characteristics.



Among the many new features of this new single-circuit rotating-type battery-charging equipment is an automatic battery cut-off and charger shutdown when the battery is fully charged. There is also an automatic disconnection of the charger from the power line and opening of the charging circuit in case of power interruption, and automatic restart of the charger upon resumption of service. It can also readily be made portable. The chargers are of completely enclosed,

THE CURE
FOR VALVE HEADACHES

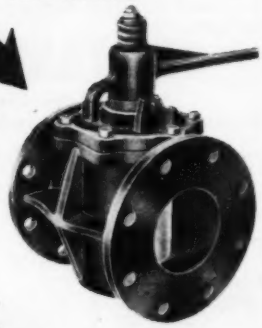
NO LUBRICATION

NO DIRT TRAPS

NO LEAKAGE

NO BINDING

DeZURIK EASY-OPERATING PLUG VALVES offer you sure relief from chronic valve troubles.



DeZurik's exclusive rubber-faced plug delivers a cushioned, conforming shut-off that's always drip-tight and air-tight. And DeZurik's famous "eccentric principle" gives you the smoothest, easiest operation you've ever known. Our free catalog tells the whole story.

DEZURIK SHOWER CO.
SARTELL, MINNESOTA

ORISKANY
WATERBURY FELTS

MADE BY

H. WATERBURY & SONS CO.
ORISKANY, N. Y.

SULPHITE MILL ACID PLANTS

SULPHUR BURNING PLANTS
JENSSEN TWO TOWER ACID SYSTEMS
GAS COOLERS—SURFACE AND SPRAY TYPE
JENSSEN PRESSURE ACID SYSTEMS
JENSSEN AUXILIARY PROCESS TOWERS
RECOVERY PLANTS—COOKING ACID

SOLUBLE BASE ACID PLANTS
SEMI CHEMICAL PLANTS
JENSSEN SO_2 ABSORPTION SYSTEMS

FOR BLEACH PLANT APPLICATION
SULPHUROUS ACID PREPARATION

G. D. JENSSEN CO. INC.
WATERTOWN, NEW YORK
WESTERN REPRESENTATIVE:
A. H. LUNDBERG, 308 Orpheum Building, Seattle, Washington
FOUNDED 1915

PAPERS MADE FINER ...at Less Cost

... with these Glidden SOYA PROTEIN ADHESIVES

ALPHA* PROTEIN

Coating papers with this chemically isolated, soya protein adhesive definitely *adds* to their quality. In addition, it introduces efficiencies which generally lower coating costs! Here are just a few of the properties of Glidden Alpha* Protein which it will pay *you* to know about:

- Alpha* Protein solution is stable over a wide temperature range.
- Alpha* Protein is compatible with the various pigments used and binds them to the fiber of the raw stock easily.
- Alpha* Protein adhesive has a color which does not affect, to any extent, the colors of the pigments used or their hiding power.
- Alpha* Protein alkaline-cut adhesive permits addition of formaldehyde to coating colors to make the finished paper water resistant.
- Alpha* Protein adhesive is free-flowing at a low water ratio.
- Alpha* Protein adhesive keeps pigments or other insolubles more uniformly suspended—prevents formation of hard, difficult-to-disperse masses.
- Alpha* Protein adhesive sets quite rapidly and dries easily without undue shrinkage or interference with the finish when the paper is calendered.

PROSEIN*

A mechanically refined soya protein adhesive, Prosein* is preferred for reasons of economy in cases where certain outstanding qualities exclusive to Alpha* Protein are not required. Compatible with Alpha* Protein and other alkaline-cut protein adhesives in all proportions. An efficient adhesive for many uses.

The Glidden Company
SOYA PRODUCTS DIVISION
5165 West Moffat St. • Chicago 39, Illinois

QUALITY Glidden PRODUCTS

*Trade Mark Registered

dead-front construction and have reverse-current protection and a polarized battery circuit which assures correct connection of battery leads. It is adjustable for all voltages and currents required by driver-ride type electric industrial truck batteries. Apparatus News Bureau, General Electric Co., Schenectady 5, N. Y.

Thermostat

Entirely frictionless—withstands extreme temperatures.

A thermo mechanical combination which is devoid of pivots and linkage and is entirely frictionless is one of the features of this new pencil type immersion thermostat. Another feature is the strain relief construction which permits exposure of the instrument to extreme temperatures without affecting the calibration. The Rocket Thermostat has been miniaturized to fit into a compact 2-inch diameter streamlined housing. Its rating is 1500 watts at 115-230 v., a-c non-inductive load. It can be supplied in various adjustment ranges to operate at temperatures from −100 F. to 700 F. This thermostat has a Bakelite adjustment knob with numerical graduations and a body constructed of alloy materials. The body of the Rocket is flexible so as to meet varied housing and mounting requirements. George Ulanet Co., 417 Market St., Newark 5, N. J.

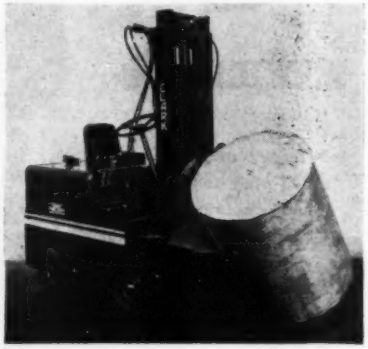
Hydraulic Jack

Develops 10 to 20 tons pressure.

Designated as the *GO-JAK*, this new hydraulic jack is suited for assembly or disassembly of large parts, force fitted parts, and other machine shop and repair shop applications. It can also be built into existing machinery. Both the pumping and releasing phases of the operation are under foot control at all times, and the hands of the operator are free to do work normally done by an assistant. It has two speeds. A selector valve allows the operator to choose the right speed and capacity to suit the occasion. Wihtol Industries, Lewis St., Eatontown, N. J.

Rotating Clamp

Simplifies handling paper and roll materials.



This new rotating clamp device can be used on gas and electric fork-lift trucks with standard rated capacities of 3,000 to 5,000 lb. It has two basic actions—clamping and rotating. Rolls may be handled in either vertical or horizontal position, and can be rotated at uniform speed through 90 degrees. Clamping and rotating are accomplished hydraulically, and a supplementary load accumulator, hydraulically actuated, serves to prevent loss of clamping pressure. The clamping arms are adjustable in three positions for handling loads of varying diameters. Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.

Grease Gun

Completely portable with built-in drop cord and rectifier for recharging.

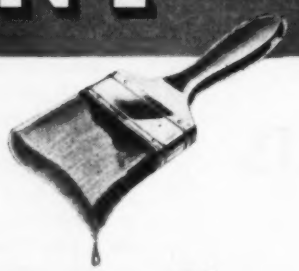
This grease gun, 23 in. high and 27½ in. long, is mounted on rubber tires and weighs about 230 lb. when loaded. Any weight of grease will flow freely and evenly through a pressurized tank, even under low temperatures. A modified Ford Starter Motor de-

THE BEST PROTECTION AGAINST CORROSION COSTS LESS IN THE LONG RUN . . . . . .

TYGON

CORROSION-RESISTANT PLASTIC

PAINT



HALFWAY protection is worse than none where corrosion is a problem. Ordinary paints provide only a shield behind which corrosion goes on, uninterrupted. Be sure. Play safe. Protect your plant and its equipment with the paint proven over a 10-year period as the paint impervious to attack by most acids and alkalies.

Tygon *corrosion-resistant plastic* Paint is made of chemically inert plastics. It air dries quickly . . . forms a tough, durable, tight-adhering plastic film that *will not* support combustion . . . that *will* resist impact and chipping . . . that *will* provide effective protection against corrosive fumes and gases long past the life of even the best industrial paints.

Write today for your free copy of Bulletin 709.

RESISTS ACIDS, ALKALIES, WATER, ALCOHOL

NON-OXIDIZING, NON-FLAMMABLE, NON-TOXIC

EASILY APPLIED WITH SPRAY OR BRUSH, DRIES QUICKLY

U. S. STONEWARE

Akron 9, Ohio

MANUFACTURERS OF CORROSION RESISTANT MATERIALS & EQUIPMENT SINCE 1865

★

BARNEY BENSON — PAUL FOSTER
HARRY HULMES — HOWARD GERBER
PETER TALBOT, JR. — CHARLES PENNINGS, JR.
ROSS H. LAWRENCE

WILLIAMS-GRAY CO.

221 North La Salle Street
Chicago 1, Illinois

★

Lindsay & Niagara Wires
Knox "Excelsior" Felts
Siamese & Richland Dryer Felts
Carrier Rope
Splicing Tissues
Deckle Webbing
Etc.

★

HUBINGER OK BRAND

Dependable Quality for 69 years . . .

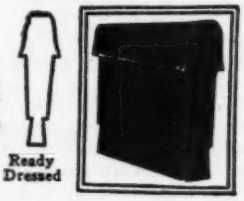
STARCH *for* **TUB SIZING**

BEATER SIZING

THE HUBINGER CO.
Keokuk, Ia. Est. 1887

"READY DRESSED" MILL COGS
LABOR SAVING — TIME SAVING

The Most Economical Filling That Can Be Put in a Mortise Wheel.



Ready Dressed

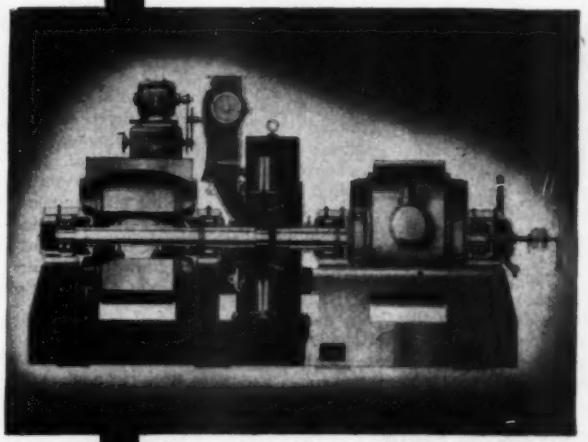
Blank Head

We Make Any Style or Size Wanted.

Write for Instruction Sheet "O" Which Is Free.

QUICK SERVICE ON ALL SIZES
THE N. P. BOWSHER CO., South Bend, Ind.

BACKED BY 72 YEARS' EXPERIENCE



Sectional View of Bauer Double-Disk Pulp Refiner

Bauer

PULP REFINERS

You get the benefit of 72 years' disk mill manufacturing experience in Bauer Pulp Refiners. What's more, you can check the performance of Bauer machines in as many pulp and paper mills as you please. There's a lot of satisfaction in having such a background of experience upon which to base your selection of refining equipment.

Bauer Pulp Refiners are being successfully and economically used for processing almost every conceivable material employed in making wood pulp, paper, board, plastics, and roofing: raw, steamed, and cooked chips from soft and hard woods; groundwood rejects; sulphite and soda pulps; kraft knotter and screen rejects; waste paper of all kinds; bagasse, licorice root, and bamboo fibers; straw and many other agricultural residues. Dirt and pitch dispersal can be effectively done by the intensive mixing action of the double disk machine.

Ask for new bulletin P-1 and specific information. If you have unusual pulping and refining problems, you are invited to utilize our laboratory facilities.

THE BAUER BROS. CO.

Springfield 99, Ohio

velops up to 5 hp. on the pump. A thumbscrew adjusts a maximum grease pressure, from 500 to 12,000 lb. psi. A metering hand nozzle can be adjusted to pass a tiny drop, or the largest shot of grease, then stop until the trigger is pulled again. This small machine is completely portable in that it requires no trailing wires or hoses. It will grease about 5000 average fittings before the battery must be recharged. Built in the nose is a rectifier and drop cord for recharging the gun's battery. Brown Grease Gun Co., Tuckaseegee Rd., Charlotte, N. C.

Lever Gate Valve

Maximum tightness and longer life.

The "Swingtite" valve has a new roller action that provides a self-cleaning and polishing effect, and also distributes the wear, since the seating position of the ball and socket design double discs changes with each closing. The malleable iron lever can be placed in four different positions with relation to spindle to suit installations. Rated for 125 lb. steam service, 300 lb. cold oil, water, and gas, the valve is made in ½-inch to 2-inch sizes. It is especially recommended for use in paper and pulp mills, textile finishing, chemical and food industries, and oil refineries. Jenkins Bros., 100 Park Ave., New York 17, N.Y.

Corrugated Board

Folds in any direction with the ease of wrapping paper.

This new corrugated board has minute scoring marks in the corrugation that permit folding at any point—across the corrugation or diagonally in any direction. It can be rolled against the corrugation just as easily as with it. Made of high quality kraft paper, the board can be fastened with pressure-sealing tape, twine, gummed tape, staples, stitches or steel strapping. It comes in stock rolls up to 72 inches wide and 250 feet long, or in sheets, cut to order and is available in four weights: 35, 55, 70 and 100 pound basis. Shelton Mfg. Co., Inc., 42 Orchard St., Long Island City 1, N.Y.

New Product Briefs . . .

▸ TUBE FITTINGS—Six more stainless steel tube fittings for fluid handling have been added to this company's standard stock items providing a total of 58 shapes and sizes of type 316-stainless fittings in the Triple-lok design now available. The Parker Appliance Co., 17325 Euclid Ave., Cleveland 12, Ohio.

▸ PALLET TRUCK—Incorporated for the first time in trucks of this type is the automotive-type brake which is mounted on the side of the drive wheel as an integral part. Truck is shorter for operating in smaller space. Roller-type handle controls two speeds forward and two speeds reverse. Electric pump is located on top of truck for accessibility. Moto-Truc Co., 1953 E. 59th St., Cleveland, Ohio.

▸ DUST COLLECTOR—New dust filter claims three advantages: (1) Dust is removed from the bags without shutting down operation; (2) shaking or flexing is eliminated; (3) there is no more gradual loss of efficiency due to building up of a dust layer on the cloth bags, with the frequent applications of blasts of reverse air. Blasts are created by main fan of the dust control system and require no auxiliary equipment. W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2, Ohio.

▸ BACK PRESSURE AND RELIEF VALVE—Suitable for heating systems, power plants and process applications where close regulation of large quantities of steam is required. This multiport valve is fundamentally an assembly of several of the patented Klipfel No. 135 back pressure valves used by many steam users. Klipfel Valves, Inc., Hamilton, Ohio.

▸ SCOOP-SHOVEL — Hydraulically-operated scoop-shovel eliminates manual shoveling when scooping, lifting, moving and dumping sand, coal, gravel, grain, dry chemicals and similar loose materials. Easily attached to the Lift Kind and Worksaver electric and gas fork trucks for operation within the plant, in the plant yard, in box cars and highway-truck trailers. The Yale & Towne Mfg. Co., Philadelphia Div., Philadelphia, Pa.

▸ STEEL ALLOY—Armco 17-7 PH stainless steel is an alloy with corrosion resistance closely approaching that of 18-8 stainless, and a strength and hardness equal to those of high carbon spring steels. Recommended for such applications as pressure tanks, diaphragms and disks, all types of springs, conveyor parts, spring clips and washers. Armco Steel Corp., Middletown, Ohio.

▸ FLUORESCENT LUMINAIRES—Two- and three-lamp industrial fluorescent luminaires with 2-½ and 5-inch lamp spacing heavy-duty lampholders are available with open-end and closed-end porcelain enamel reflectors. Reflectors have an average reflection factor of over 82% and the shielding angle is approximately 13 deg. Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

▸ PLASTICIZER—New dioctyl phthalate plasticizer is now odor free, has low acid number and crystal clear color. These improvements have been obtained with no sacrifice of other plasticizer properties, outstanding of which is its excellent electrical characteristics. B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio.

▸ STEEL HARDENING COMPOUND—Hard-N-Deep is a powdered chrominum-carbon material which, under the action of heat, penetrates the surface of the part being treated and produces a carboning, nitriding and chromizing action. One treatment produces a case of about 1/32 of an inch. The Miracaloy Corp., 30 Broadway, New York 4, N.Y.

▸ LIGHTING UNIT—Outstanding feature of this industrial lighting fixture is the patented "double-wall" hand blown flawless, crystal clear glass reflector, which is cleaned with any solution without removing it from the housing. Known as Model 66 Hy-Bay Unit. Uses a 750 or 1000 watt incandescent or 400 watt mercury lamp. Midwest Lighting Products Co., P.O. Box 536, Edgewater Branch, Cleveland 7, Ohio.

▸ OIL ADDITIVE—If properly used this new oil stimulant is claimed to increase horsepower yield by reducing wasteful friction. Completely non-corrosive and non-acid forming, and described as non-injurious to any metal. When used with oil or grease, it forms a microscopic but exceptionally tough lubricating film that penetrates into the pores of metal. Potential industrial uses are said to be limitless. Power Ball Oil Co., Inc., 911 Huger St., Columbia, S.C.

▸ PHOTOELECTRIC CONTROL—Photoswitch photoelectric control Series 20 is particularly recommended for such applications as counting, conveyor control, short-range signal systems, motor or valve control, production inspection, etc. It is available with phototube integral with the control, or located in a separate small housing for applications where space is limited. Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.

▸ SAFETY DROP HOOK—Coffing Safety Drop hook is a mechanical type using toggle action. Hook has been factory tested for 100% overload and is reported to be the ideal drop hook where quick release of loads is necessary. 6000 lb. capacity model weights only 2½ lb. Coffing Hoist Co., Danville, Ill.

▸ POLYVINYL CHLORIDE RESIN—Designated Geon resin 101EP, this resin is particularly adaptable to both Banbury and powder mixing and tests show that marked increases in processing rates, at reduced operating temperatures, are possible. In mill mixing, Geon 101 EP does not effect great reductions in cycle time; however, it is stated that savings of 10-20% can be achieved with correct mixing procedures. B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, Ohio.

The part played by a superintendent in personnel relations

(Continued from page 713)

young men today are high school graduates; and those that have ambition want an opportunity to go ahead, and need to feel that they have an equal chance if they are willing to work for it.

Many of these young men could be the managers of tomorrow; failing to open the doors to future advancement on the part of industry is a deep seated cause of dissatisfaction that discourages good personnel relations.

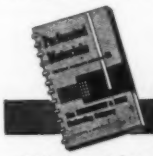
The value of training and development for the manager or executive of tomorrow is becoming more and more apparent. Managerial success is coming to be recognized as requiring skill in handling men or getting and keeping good personnel relations, not only the acquirement of highly technical knowledge and skill of making paper.

The part played by a superintendent in personnel relations involves: (1) an understanding of the areas in which you as a superintendent must work: namely, employment, safety, wages and benefits, leisure time activities and training and development; and (2) really work in and through them to make your men like and respect you as a superintendent and the company which you represent, if you want them to be on your side, when tough problems face you.

Peak Screening Performance
H & K PERFORATED METALS

√ Bull Screens
√ Chip Screens
√ Pulp Screens
√ Digester Bottoms

- Smooth, easy-to-clean surfaces
- Accurate and uniform hole sizes
- Standard or special perforations
- Stainless steel and corrosion resisting alloys a specialty
- Rolling, forming and other fabricating



Harrington & King Perforating Co

Write for catalog No. 62

5654 Fillmore St., Chicago 44, Ill.
114 Liberty St., New York 6, N. Y.

The Trade-Mark of
Dependable Felts

The Waterbury Felt Company
SKANEATELES FALLS, N. Y.

POSITION WANTED

SALES EXECUTIVE—48, member TAPPI, SAPI; wide acquaintance with publishers, converters, merchants, printers. Experienced book, bond, coated, groundwood, sulphate. Capable manager. Personable and aggressive. Available November 1. Address: Box 503, The Paper Industry.

WANTED—Shipping Superintendent. To warehouse and ship paper bags, rolls, sheets and miscellaneous paper products. Must be able to direct labor efficiently and economically. The opportunity is in large mill in Southeast. Climate excellent. When applying state full qualifications, experience, education and references. Address: Box 504, The Paper Industry.

MISCO
STAINLESS STEEL CASTINGS
for all equipment exposed to corrosion by sulphite acids or other corrosive agents
MICHIGAN STEEL CASTING CO., DETROIT 7, MICH.

GRINDERS
MACHINE KNIFE • SAW
FACE • CARBIDE SAW
BENCH • SURFACE
SAMUEL C. ROGERS & CO.
192 DUTTON AVE.
BUFFALO 11, N. Y.

EXTRAS···
···AT NO EXTRA COST

when you specify
SOLVAY

Supplying chemicals to American industry means more than meeting specifications at a price.

With Solvay . . . it means prompt, *dependable* delivery from coast-to-coast warehouse stocks . . . a continuing supply from five big plants situated in America's industrial centers.

. . . **It means** an all-inclusive *working* knowledge of alkalies, the result of sixty-nine years of experience. And Solvay's "Industry-Wise" Technical Service offers a specialized service that is exclusive with Solvay—a corps of experts who know *your* particular industry.

These "extras"—"extras" that cannot be shown in a specification, or found on a price list—are yours at no extra cost when you deal with America's leading manufacturer of alkalies. Next time you order alkalies and associated chemicals . . . specify Solvay.

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY
PRODUCTS

Soda Ash • Caustic Soda • Caustic Potash • Chlorine • Potassium Carbonate
Sodium Bicarbonate • Nytron • Calcium Chloride • Specialty Cleansers • Ammonium Bicarbonate • Sodium Nitrite • Para-dichlorobenzene • Ortho-dichlorobenzene
Monochlorobenzene • Methanol • Ammonium Chloride • Formaldehyde

The Paper Industry New Literature

Books

THE ECONOMICS OF THE PRINTING INK INDUSTRY. By Robert S. Aries and Anthony Nickolaus. Published by Chemonomics, Inc., 400 Madison Ave., New York 17, N.Y. 6½ x 9. 108 pages. $5.00.

Said to be the first authoritative industry survey in the field of printing inks, this volume includes many features of value to the man concerned with the manufacture of paper for printing use. After opening the book with a chapter on the history of ink manufacture, the authors continue with a chapter concerning firms in the field, and the number and location of their plants. Seven other chapters, devoted to raw materials, processes, product, foreign developments, technical developments, and future outlook of the industry, follow. One chapter, "The Effect of Ink on Related Industries," should be of definite interest to the paper manufacturer.

Throughout the book, charts of graphs of such subjects as plant locations, production of pigments, and flowsheet of printing ink manufacture help to clarify the authors' remarks. Sixteen tables are included. The volume closes with an extensive bibliography of references and a listing of the names and addresses of the leading ink manufacturers in the United States.

WOOD PULP STATISTICS. Compiled by D. A. Dennis. Published by United States Pulp Producers Association, Inc., 122 East 42nd St., New York 17, N.Y. 8 x 11. 211 pages. Spiral bound. $5.00.

This volume, the 1950 edition of the Association's yearly compilation, is a statistical record of the historical trends in the important pulp producing and consuming countries of the world. Divided into the three sections of the United States, Foreign Countries, and World Summaries, each section discusses such sub-subjects as capacity, production, new supply, inventories, imports and exports, prices and capacity for both pulpwood and paper.

A complete explanation of terms opens the book, which is heavily tabled and diagrammed for quick and easy reference of trends. As the publishers suggest, such material as this volume contains may well be useful in the mobilization period which probably lies in the future.

PROLOGUE TO TOMORROW. By Robert Keith Leavitt. Published by Pennsylvania Salt Manufacturing Co., Philadelphia, Pa. 6 x 9. 101 pages. Free.

Directors of the Pennsylvania Salt Manufacturing Co. have marked the 100th anniversary of the inception of their company with the publication of this volume, a history of the firm. Written from the standpoint that "what's past is prologue," the book describes as impartially as possible the successes and failures of the company's first 100 years as indicative of future progress and growth.

Mr. Leavitt, chosen as author for his reputation as a historian, has written the book in an easy and informal style which succeeds in making it interesting and informative reading; several references to the creation or discovery of chemicals now used extensively in the manufacture of pulp and paper should be of especial interest to the industry. Effectively bound and indexed, this volume would be a worthwhile addition to paper and pulp mill libraries.

THE HANCHETT SAW AND KNIFE FITTING MANUAL. Compiled and edited by Kent S. Hanchett. Published by Hanchett Manufacturing Co., Big Rapids, Mich. 6 x 9. 742 pages. $5.50.

Now in its seventh edition, this book continues to interest operators of filing rooms and all industrial users of this equipment. It is a practical compilation of fact and opinion about the use and care of saws and knives in industry, with emphasis on their proper care.

Packed into this easy-to-read book are over 200 drawings, photos, charts, and diagrams. The latter include suggested floor plans for the filing room. Subjects covered in the text include: the best methods of circular and band saw sharpening, tensioning, brazing, welding, swaging, shaping, filing, setting, and knife and shear blade grinding.

There are a number of contributions by filing room superintendents and other mill men. The editor says of these: "The purpose of this Manual is to afford information, to stimulate personal inquiry, criticism, and experimentation, on the part of the fraternity of saw filers, each of whom should put to personal use only such methods as prove best by test for his own individual conditions of operation." With this in mind, the practical reader should find plenty to interest him.

Booklets and Pamphlets

THE DRYING OF SULPHITE PULP. Prepared by the 1946-47 Sulphite Committee of the Technical Section, Canadian Pulp & Paper Ass'n, 3420 University St., Montreal 2, Canada. Paper bound. 8½ x 11. $2.50. Provides in tabular form, data on the operation of sulphite pulp dryers and, if possible, some laboratory results of the effects of drying on pulp quality. Questionnaire circulated to mills drying sulphite pulp, with a summary by the Committee preceding each section of the replies has been included in this report.

ISA TENTATIVE RECOMMENDED PRACTICE RP5.1, INSTRUMENTATION FLOW PLAN SYMBOLS. Published by Instrument Society of America, 921 Ridge Ave., Pittsburgh. $1.00 each, quantity prices upon application. This report by the Association presents a suggested system of symbols and identifications for industrial process instrumentation equipment which may designate and identify such equipment on flow plans; it is suggested that use of these symbols would promote a uniformity of practice simplifying and expediting instrumentation work. Replies to questionnaires answered by 142 individuals and organizations were utilized in modifying and correcting a system suggested to those who were queried.

TIPS ON TRADE WITH MARSHALL PLAN COUNTRIES. By E. K. Gubin. Published by National Association of Manufacturers, 14 W. 49th St., New York 20, N.Y. 46 pages. This brochure explains how to go about getting orders financed with ECA funds, discusses the future of ECA-financed business, and lists the forms of ECA assistance available to small business. An appendix briefly explains the Marshall Plan accomplishments, basic features of the plan, etc., with added information on prices, discounts and commissions.

CAPTAIN MARVEL AND THE LIEUTENANTS OF SAFETY series. Published by Ebasco Services, Inc., 2 Rector St., New York 6, N. Y. 3½c ea. on orders up to 10,000. Artist and script writer on the original "Captain Marvel" series are doing the work on these new safety booklets which are designed to tell the story of utility safety work to mass audiences through use of the comic book technique. First booklet of the series is called "Danger Flies a Kite" and features with color cartoon one phase of the precautions needed in the electric utility field for the protection of the public as well as the industry's workers. Other elements of the utility industry will be featured in subsequent issues.

THE LOWER LIMIT OF FLAMMABILITY AND THE AUTOGENOUS IGNITION TEMPERATURE OF CERTAIN COMMON SOLVENT VAPORS ENCOUNTERED IN OVENS. Published by Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. Nineteen different solvents were investigated to determine the lower limit of flammability and the autogenous ignition temperature as a part of the Research Division of the National Board of Fire Underwriters' program

Only "Lightnin® Mixers"

MIXCO® Engineered

Give You All These "EXTRAS"

PORTABLE MIXERS—Nearly 30 models, from 1/8 to 3 H.P. Wide selection of motors and materials. *Write for Catalog B-75.*

AGITATION THAT FITS THE JOB. Every LIGHTNIN Portable Mixer is accurately sized to do the work you expect of it. Larger LIGHTNIN units are custom engineered to the application.

EQUIPMENT BUILT TO LAST. Every part of every LIGHTNIN Mixer is designed and built *specifically for mixing service.*

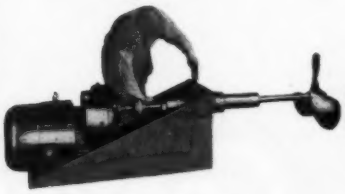
SATISFACTION GUARANTEED. Every LIGHTNIN Mixer is guaranteed to do the job for which it is recommended—or you get your money back!

A PACKAGE READY TO USE. When you buy a LIGHTNIN, there is nothing extra to buy or build. You clamp or mount the mixer on the tank . . . connect to power supply—and start mixing!

MIXING SKILL UNSURPASSED. Mixco engineers help you with exclusive data that enables you to *predict process results accurately.* MIXCO's 25-year backlog of mixing technology is absolutely without equal in the industry!

Send for complete literature on types shown

TOP ENTERING AGITATORS—Nearly 100 standard models, from ¼ to 100 H.P. For open or closed tanks. *Write for Catalogs B-78 and B-89.*



SIDE ENTERING MIXERS—For tanks up to 5 million gallons capacity. Sizes from 1 to 25 H.P. *Write for Catalog B-76.*

USE THEM FOR...

Stock chest agitation • Feed water conditioning • Continuous or batch treating • Waste neutralization • Clay slurry and coating materials

MIXING EQUIPMENT CO., Inc.

(MIXCO)

1035 GARSON AVENUE, ROCHESTER 9, NEW YORK

In Canada: William & J. G. Greey, Ltd., Toronto

"Coes" KNIVES

You lose **when you handicap your cutter with an inferior knife.**

You win **when you use COES MICRO-GROUND—the highest quality.**

SINCE 1830 **Coes** MICRO GROUND

LORING COES COMPANY

WORCESTER • MASSACHUSETTS

Federated first for Lead Products

Asarco Sheet Lead... All commercial weights and sizes. Chemical...Tellurium Chemical...Antimonial.

Asarco Lead Pipe... All commercial sizes. Special sizes on request. Chemical...Tellurium Chemical...Antimonial.

Asarco Lead and Lead Lined Valves ... Split Type "Y" and "Angle", Standard "Y", Gate, Check, Hard Lead "Y", Plug and Seat.

Asarco Lead Fittings... Elbows, Crosses, Tees, "Y's", (with plain ends, with flanges on, or for flanging in the field). Chemical and Antimonial.

Asarco Lead Wool... 5/8" rope in 50 lb. waterproof bags.

Asarco Lead Specialties... Extrusions and Castings to specification.

See Federated also for Lead Lined Pipe Lead Lined Fittings, Lead Lined Flanges

Federated Metals Division

AMERICAN SMELTING AND REFINING COMPANY, 120 BROADWAY, NEW YORK 5, N. Y.

Chilled Iron CALENDER ROLLS
by Continental
When ordering from your mill equipment supplier . . . specify CONTINENTAL.
For precision in custom or standard rolls, rely on the experience of Continental. In many years of meeting the most rigid roll requirements of the ferrous, non-ferrous, textile, paper and milling industries, Continental has earned a reputation for precision and metallurgical accuracy. For a prompt quotation, submit sketches or specifications.
Continental
FOUNDRY & MACHINE CO.
CHICAGO · PITTSBURGH
PLANTS AT EAST CHICAGO, IND., WHEELING, W. VA., PITTSBURGH, PA.

of research relative to the safety of industrial drying ovens. Details of the investigation and test record are reported in this bulletin.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Alloy Steels. Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.—4-page bulletin gives engineering data on two high performance alloy steels supplied in the heat treated condition. Data tables include minimum mechanical properties, test results, properties at high temperatures, and machinability ratings.

Heating System. Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.—32-page brochure concerns application of the Dowtherm heating system in process industries. Divided into two sections, the first contains simplified flow diagrams, flow descriptions, and photographs of a representative group of processes while the second part describes Dowtherm and the various methods of utilizing it.

Blowdown System. The Henszey Co., Watertown, Wisconsin—4-page folder and chart shows plant engineers how to determine the proper size continuous blowdown system for an installation. Advantages and disadvantages of various types of installations are also given.

Spray Drying. Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y.—8-page booklet describes packaged-unit spray dryers, and gives complete information as to design and uses of the Snell spray tower. Representative cost and performance data are also given.

Labor Policy and Practice. The Bureau of National Affairs, 1231 24th St., N. W., Washington 7, D. C.—This four-volume series consists of three loose-leaf reference divisions—one on labor relations, one on wages and hours, and the third on personnel management—and a weekly bulletin which rounds up new developments in these fields, with charts and graphs of current practices and economic data.

Clarification and Sludge Collectors. Ralph B. Carter Co., Hackensack, N. J.—16-page revised Bulletin No. 4906 gives complete engineering data and specifications and comprehensive capacity tables, as well as detailed diagrams, on three types of circular collectors used in sewage treatment, industrial waste treatment or water purification. Includes photographs of equipment and typical installations.

Cylinders. Ledeen Mfg. Co., 1600 S. San Pedro St., Los Angeles 15, Calif.—12-page Catalogue No. 500 gives dimensions and weights, ratings and limitations on the line of medium duty, heavy duty and super duty cylinders. Information regarding selection of cylinders is included, along with illustrations and designs of rod and head attachments.

Chemical Analyses. Chemical Specialties Research Laboratories, Box 33, Ansonia Station, New York 23, N. Y. —Brochure describes over 700 analyses available on household and automotive chemical specialties.

Steam, Air, and Gasoline Traps. W. H. Nicholson & Co., 12 Oregon St., Wilkes-Barre, Pa.—32-page catalogue No. 250 entitled "Nicholson Steam Traps" describes different types of traps and separators. There are 5 types of thermostatic steam traps, 2 types of weight-operated traps, piston operated steam traps and 3 types of steam, air and gas separators. This brochure has capacity tables, installation diagrams, and a section containing data, charts and formulae for determining the proper size trap for specific applications.

Steam Plant Equipment. Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, Pa.—12-page catalogue called the "All Products Bulletin" describes six main products: blow-off valves, both low, medium, and high pressures; water columns and gauges; liquid level indicators and recorders; expansion joints, and steam traps, strainers and spray nozzles. Illustrated with photographs and diagrams.

Water Conditioning. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee, Wis.—Bulletin No. 28X7446 tells of the use of the "S and B" method for determining water hardness. The "S and B" method makes use of an indicator which changes from cherry red to bright blue at the end point of titration; the color change is immediate and readily observed, permitting a complete determination in less than one minute. Illustrated with photographs.

Gear Reducers. De Laval Steam Turbine Co., Trenton 2, N. J.—28-page bulletin H-HS covers a new line of heavy duty herringbone gear reducers for capacities up to 1000 hp. It contains complete descriptions of single, double and triple reduction units, complete horsepower rating tables for standard and semi-high speed units, overhung load rating tables, dimensions and weights. There is a section telling how to select herringbone gear reducers. Illustrated.

Chemical Motors. Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.—4-page Booklet No. B-4687 describes Lifeline chemical motors for operation in atmospheres where corrosive fumes and liquids are encountered. Results of salt-spray corrosion tests, and tests comparing the relative corrosion of shot-blasted cast iron and machined steel, are given.

Tiering Truck. Lyon-Raymond Corp., 8071 Madison St., Greene, N. Y.—4-page Bulletin 701 describes the new riding type Space-Maker Electric tiering truck. Three models are explained in this bulletin: the skid tiering

A slender wire transforms a world of utter silence into the dwelling place of music, lapping brooks and loved ones' voices. In like manner, thorough-going care with reference to every strand of wire is indispensable to the manufacture of quality Fourdrinier wire cloth.

THE LINDSAY WIRE WEAVING COMPANY
14001-14299 ASPINWALL AVENUE • CLEVELAND 10, OHIO

Lindsay WIRES
FOR PAPER MILLS

NINE Publications for the Papermaker

Modern Pulp and Paper Making	$7.25
Drying of Paper on the Machine	1.50
Procedure Handbook of Arc Welding Design and Practice, 9th Edition	2.00
Outside U.S.A.	2.50
Notes and Observations on Beaters	1.00
Lessons in Papermaking—Part 1	1.00
Lessons in Papermaking—Part 2	1.00
Trouble on the Paper Machine	.75
Pulp Bleaching (A Symposium)	.50
Technology of Papermaking Fibres	.50

Mail your order with payment to:

FRITZ PUBLICATIONS, INC.
59 E. Van Buren Street, Chicago 5, Illinois

Ohio Boxboard Company's successful white water filtration installation is using

DICALITE
Diatomaceous Filteraids

Dicalite engineers have co-operated on this job for several years - they will gladly assist in any water filtration problem you have.

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION

Write to 614 South Flower Street, Los Angeles 17, Calif.

W. B. COHAN
Consulting Engineers
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS
Structural, Mechanical and Electrical Design for the Construction and Maintenance of
PAPER AND PULP MILLS
PROCESSES PIPING PLANT LAYOUT

FREDERICK WIERK, P.E.
CONSULTING ENGINEER
220 E. 42nd Street — New York 17, N. Y.
Reports and Designs for Construction or Modernization of Pulp & Paper Mills, Steam and Hydro Power. Stream Pollution Abatement.

ARTHUR C. DRESHFIELD, Ch.E.
CONSULTANT
Research . . . Development . . . Control
Market Research
Laboratory Investigations thru affiliation with
Chicago Testing Laboratory
536 Lake Shore Drive, Chicago 11, Illinois

SPONSORED INDUSTRIAL RESEARCH
BJORKSTEN RESEARCH LABORATORIES
CHICAGO, ILL. 13791 S. AVE. "O"
MADISON, WIS. 323 W. GORHAM ST.
NEW YORK, N. Y. 50 E. 41ST ST.

model, pallet tiering model for single faced pallets and a pallet tiering model for double faced pallets. Photographs illustrate its space saving features and suggest many applications. Complete specifications of all models are listed in detail.

Lift Truck. Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.—8-page bulletin 5031 presents the features of the new Barrett MD Hydraulic Lift Truck. New features include self-contained hydraulic system, complete hydraulic lifting and lowering with mutiple stroke, selective lift which provides fast operation for light loads and an easy lift for heavy loads, single frame, full 6-inch lift and a full 270 degree handle swing. The bulletin contains complete specifications on both the MD and its pallet model, the MX. Illustrated with diagrams, drawings, charts, and photographs.

Temperature and Pressure Instruments. Fischer & Porter Co., Hatboro, Pa.—12-page bulletin 86 describes the new temperature instruments, called Ratotherm, and pressure instruments, called Ratogage. The booklet includes information on combinations of temperature, pressure, flow, etc., in one instrument case, and discusses cascade control. Also included is a description of the Type 3 Pneumatrol unit with proportional band, automatic reset and derivative action control. Illustrated with charts, drawings and photographs.

Vacuum Cleaning. U. S. Hoffman Machinery Corp., 105 Fourth Ave., New York 3, N. Y.—Bulletin A-752 describes this new heavy-duty vacuum cleaning portable that provides 4.4 cubic feet of dust storage capacity and is designed for continuous operation on heavy dust deposits. Specifications, construction and operating capacity are given in charts, along with a cross-section view of the cleaner. Illustrated.

Varidrive Motors. U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54, Cal.—Four page Bulletin 1601 exhibits 15 features of the recently developed low-priced line of fractional horsepower motors. It features the VA series of variable speed motors, and illustrates seven modifications of the design.

Heavy-Duty Compressors. Ingersoll-Rand, 11 Broadway, New York 4, N. Y.—8 page bulletin entitled "The T Series Type 30 Compressor" gives full details of this new line of equipment. Photographs, cut-away drawings and tables give information regarding engineering data, sizes, dimensions, and its running features.

Water Hardness. Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.—4 page Bulletin 1RE50 describes the extremely rapid, simple and accurate new one-minute tests for determining water hardness. Procedures, reagents and equipment are pictured and described.

Liquid Level Indicators. Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, Pa.—20 page Bulletin WG-1823 describes liquid level indicators and auxiliary attachments for remote indication of liquid level in boilers, feed water heaters, storage tanks, etc. It contains complete details—construction and operation, installation suggestions, dimensions, application diagrams, pictures of typical installations, and many other helpful details.

Adhesives. B. F. Goodrich Co., Akron, Ohio—8 page bulletin 9160 features a table which lists by number each adhesive it manufactures, the materials for which they are specifically recommended and the method by which the most effective bond is created. The catalogue section describes each adhesive, giving the recommended uses, the method of application, color, drying time, weight per gallon and total solids and thinner used. Illustrated.

Turbines and Auxiliaries. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee Wisc.—A new 56 page bulletin describing the design and construction of Francis, propeller and impulse type, hydraulic turbines and such auxiliaries as pressure regulators, special high head valves, butterfly valves and cabinet type governors for large units has been announced. It shows typical installations throughout the United States, Canada and Mexico, as well as foreign countries. There is also a section devoted to testing facilities at the manufacturing plant.

Self-Priming Pump. Goulds Pumps, Inc., Seneca Falls, N. Y.—8 page Bulletin 636.1 gives complete information on the new self-priming centrifugal pumps. They are of a new design that eliminates valves and yet gives efficiency comparable to standard centrifugal pumps. Illustrated with photographs and charts.

Treated Paper. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.—16 page booklet entitled "Quality Advantages Gained With Alwax and Waxine Sizes" shows the importance and versatility of these two products to the paper industry. It includes a survey of treated paper listing more than 150 grades of paper and paperboard, and recommends sizes to be used and the results which are obtained.

Roll Grinders. Farrell-Birmingham Co., Inc., Ansonia, Conn.—16 page bulletin No. 118, describes and illustrates mechanism for grinding calender rolls, and includes a thorough explanation of the swing-rest principle which contributes to the extreme accuracy of the roll grinder's performance. Illustrated.

Paper Cutter. Harris-Seybold Co., 4510 E. 71st St., Cleveland 5, Ohio—A new folder containing illustrations, descriptions and specifications of the 34-inch paper cutter has been announced. The enclosures are devoted to operating features of the cutter.

Overhead Cranes. Northern Engineering Works, 2615 Atwater St., Detroit 7, Mich.—8-page, illustrated Bulletin HL-115 "Northern HI-LIFT Overhead Cranes" describes design and construction of a new line of auxiliary overhead electric traveling cranes. Brief specifications are supplemented with illustrations of sub-assemblies, close-up views and installations in various types of service.

Reactors. Cochrane Corp., 17th St. below Allegheny Ave., Philadelphia 32, Pa.—16 page Bulletin No. 5001 describes the new line of sludge contact reactors. It is divided into sections, describing the principle of the reactors, how they operate, types, applications, and auxiliary equipment. Illustrated.

Couplings and Fittings. The B. F. Goodrich Co., Akron, Ohio—A new 12 page catalogue describes hose couplings and fittings of various types. It pictures and gives details on each type coupling and fitting, together with specifications, general and maximum pressure recommendations and a description of threads.

Removal Equipment. R. P. Adams Co., Inc., 225 E. Park Drive, Buffalo 17, N.Y.—New 8-page Bulletin No. 176 describes the protection of air-powered tools, gauges, and process equipment against air-borne impurities. It tells of equipment for removal of water, oil and pipe scale from compressed air systems. Illustrated.

Water Problems. Hall Laboratories, Inc., Hagan Building, Pittsburgh, Pa.—10 page bulletin entitled "Your Most Important Raw Material"—describes industrial water problems of all kinds—procurement, treatment, usage and disposal—and the facilities and services offered to cope with them. Illustrated.

Pumps. Layne & Bowler, Inc., Memphis, Tenn.—16 page bulletin contains cut-away drawings of pump bowls and discharge column. Sixteen sketches show new pumps applied to river and re-lift service, boosting, recirculation, cooling tower, drainage, gas and oil pumping, and fire pumps.

Speed Reducers. DeLaval Steam Turbine Co., Trenton 2, N. J.—32 page bulletin G-WBV covers the new line of single reduction horizontal or vertical worm gear speed reducers. It describes all the latest revised horsepower ratings, and tells how they are manufactured, lists types of speed reducers, selection tables, horsepower ratings, overhung load rating tables, dimension tables, and includes a section describing vertical speed reducers for cooling tower service.

COVEL SAW SHARPENERS • HANCHETT KNIFE GRINDERS

HANCHETT MAMMOTH AK

KNIFE AND SHEAR BLADE GRINDER

World's finest heavy-duty traveling wheel grinder for high speed grinding with extreme accuracy and efficiency. Fully equipped to your own specified requirements. Can be furnished in either built-in motor drive or V-belt drive.

Widely used for paper, planer, hog, barker, chipper, and veneer knives. AK grinds flat or concave bevel on any desired angle or square edge. Built in lengths from 84" to 350" and longer when required.

AK

Write for complete data PI-100

HANCHETT MANUFACTURING CO.

World's Largest Manufacturers of Saw Sharpening and Knife Grinding Machinery

MAIN OFFICE—BIG RAPIDS, MICH. WEST COAST—PORTLAND, ORE.

and move them *faster* and *more economically* than any other method.

Owen engineers complete grapple handling systems to meet your requirements.

Former users of the old style "sling system" now attest to claims of up to 75% reduction in labor with Owen Pulpwood Grapple Systems. Write for details TODAY.

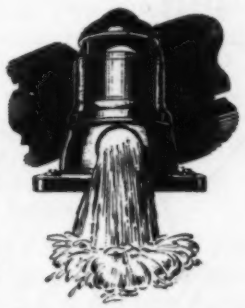
OWEN PULPWOOD GRAPPLES LOWER HANDLING COSTS

THE OWEN BUCKET CO.

6015 BREAKWATER AVE. • CLEVELAND, OHIO

BRANCHES: NEW YORK • PHILADELPHIA • CHICAGO • BERKELEY, CALIF.

SAVING DOLLARS



Layne Well Water Systems are noted for their extra heavy production of water at low operating cost. These systems are big money savers wherever generous quantities of water are required. They can be installed in small space and needs very little attention. For further information, catalogs, etc., address

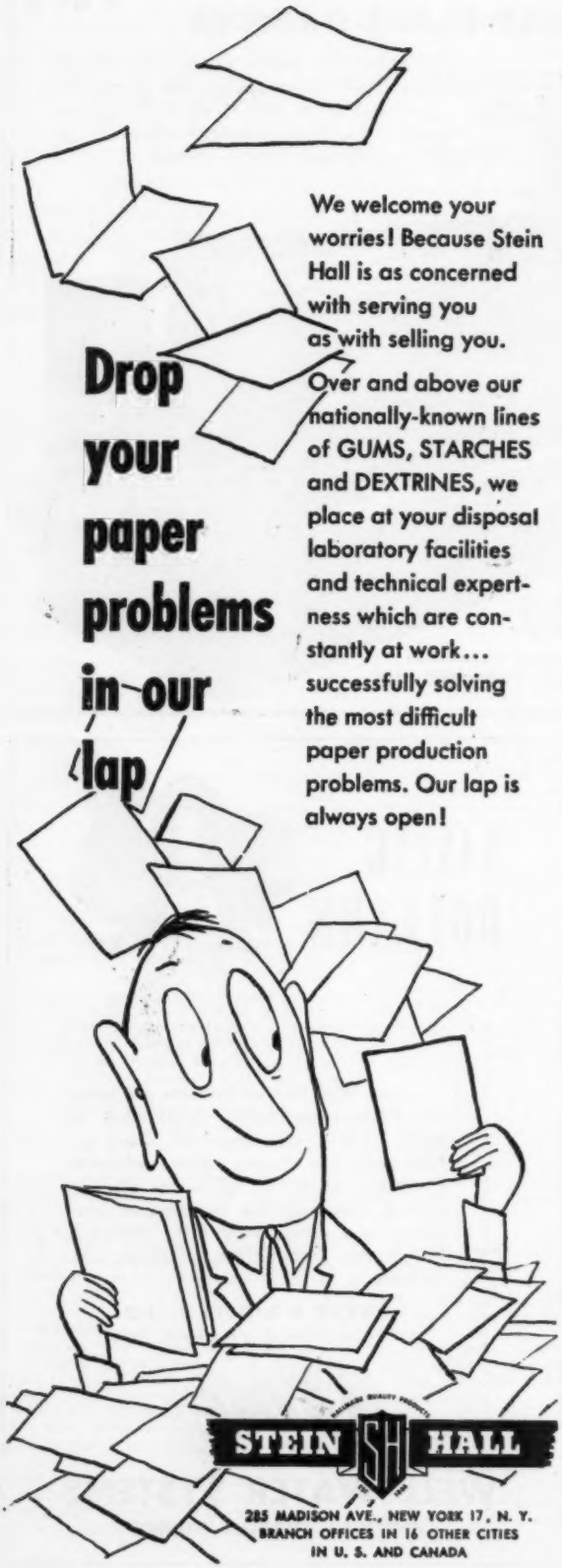
LAYNE & BOWLER, INC.

General Offices, Memphis 8, Tenn.

LAYNE

WELL WATER SYSTEMS

VERTICAL TURBINE PUMPS


Drop your paper problems in our lap
We welcome your worries! Because Stein Hall is as concerned with serving you as with selling you.
Over and above our nationally-known lines of GUMS, STARCHES and DEXTRINES, we place at your disposal laboratory facilities and technical expertness which are constantly at work... successfully solving the most difficult paper production problems. Our lap is always open!
STEIN HALL
285 MADISON AVE., NEW YORK 17, N. Y.
BRANCH OFFICES IN 16 OTHER CITIES
IN U. S. AND CANADA

MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Blue Overalls	9.50 to 10.00
Corduroy, Men's	4.75 to 5.00
Corduroy, Ladies'	4.75 to 5.00
Washables, No. 1	4.75 to 5.00
Percales	8.25 to 8.50
Light Prints, No. 1	7.50 to 7.75
Khaki Cuttings—	
Bleachable	7.25 to 7.50
Unbleachable	6.25 to 6.50
New White Canvas	14.50 to 15.00
Canton Flannels, Bleached	15.50 to 16.00
Canton Flannels, unbleached	13.50 to 14.00
Shirt Cuttings—	
New White No. 1	15.50 to 16.00
White Shrunk	14.50 to 15.00
Silesias No. 1	9.50 to 10.00
New Unbleached	15.50 to 16.00
Fancy	7.50 to 7.75
Linen Cuttings—	
American	9.50 to 10.00
White	16.50 to 17.00
Grey	16.00 to 16.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	2.10 to 2.20
No. 2	2.00 to 2.10
No. 3 and 4	1.80 to 1.90
Twos and Blues—	
Repacked	2.75 to 3.00
Thirds and Blues—	
Repacked	2.50 to 2.75
Miscellaneous	2.00 to 2.25
Whites, No. 1—	
Repacked	4.50 to 4.75
Miscellaneous	3.25 to 3.50
White, No. 2—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shopperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.75 to 6.00
Domestic	6.50 to 6.75
Wool Tares—	
Light	6.00 to 6.25
Heavy	6.50 to 6.75
No. 1 Scrap Bagging	5.75 to 6.00
Manila Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.00 to 5.25
Sisal Rope—	
No. 1 large	5.50 to 5.75
No. 1 small	5.00 to 5.25
New Burlap Cuttings	6.75 to 7.25
Jute Threads—	
Foreign (Nom.)	7.00 to 7.50
Domestic	7.00 to 7.50
Strings—	
No. 1 sisal	5.00 to 5.25
No. 2 sisal	4.50 to 4.75
Soft jute	4.75 to 5.00
Mixed	3.00 to 3.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts	170.00 to 175.00
Hard White, No. 1	125.00 to 135.00
Soft White No. 1	110.00 to 120.00
Soft White, one-cut	125.00 to 135.00
Soft White, Misc.	95.00 to 100.00
Fly Leaf, No. 1	50.00 to 55.00
Fly Leaf, Woody No. 1	35.00 to 40.00
No. 2 Mixed Col. Woody	30.00 to 32.50
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	33.00 to 35.00
Mixed Books	20.00 to 22.50
Ledger Stock—	
No. 1 White	75.00 to 80.00
No. 1 Mixed (Colored)	55.00 to 60.00
Manilas—	
New Env. Cuttings	85.00 to 90.00
New Env. Cuts, One-Cut	——
Extra Manilas	45.00 to 50.00
Manila Tab Cards, Free of Ground Wood	110.00 to 120.00
Colored Manila Tab Cards	65.00 to 70.00
Kraft—	
New Envelope Cuttings	100.00 to 105.00
Tripled Sorted No. 1 100%	60.00 to 65.00
No. 1 Old Assorted	45.00 to 50.00
News—	
White Blank	75.00 to 80.00
Overissue	32.00 to 34.00
No. 1 Folded	28.00 to 30.00
Old Corrugated Containers	34.00 to 36.00
New Jute Corrugated Cuts	33.00 to 35.00
Mill Wrappers	25.00 to 26.00
Box Board Chips	23.00 to 24.00
No. 1 Mixed Paper	23.00 to 24.00

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.05—
Ground, cwt.	3.80—
Powdered, cwt.	4.20—
Blanc Fixe—	
Pulp, bulk, ton	80.00—
Dry, barrels	85.00—
Bleaching Powder—	
Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard),	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	39.00 to 40.00
Argentine, lb.	35.00 to 36.00
China Clay—	
Domestic Filler	
Bulk (mine) ton	10.00 to 15.00
Domestic Coating	
Bulk (mine) ton	15.00 to 25.00
Imported (ship side)	
Bulk (lump) ton	22.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.80 to 2.85
Gelatine (silicin), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.29¼ to .29½
Litharge, powd. bbl. lb.	.14¾ to .15¾

Rosin (Gum)— New York, per 100 lbs.

E	7.10—
F	7.75—
G	7.75—
WW	8.00—
Rosin (Wood), carlots, F.O.B. South	5.00—

MARKET QUOTATIONS

Salt Cake—
Dom. bulk (wks) ton..... 22.00 to 24.00
Imp. bulks on dock—
(Atl. ports) ton (Nom.) 25.00—

Soda Ash—
Bulk (works), cwt..... 1.10 to 1.25
Paper Bags, cwt..... 1.35 to 1.50

Soda (Caustic)—
Solid drums, cwt..... 3.20 to 3.25
Ground and flake, drums, cwt. ..... 3.60 to 3.65

Sodium Silicate—
60 deg. 55 gal. drums, (works) cwt..... 1.35 to 1.45
40 deg. 35 gal. drums, (works), cwt. ..... 1.05 to 1.20

Starch—
Pearl, 140 lb. bags, cwt....5.42—
Pearl, barrels, cwt..... 5.42—
Paper, (Sp.) bags, cwt..... 5.42—
Powdered, barrels, cwt..... 5.53—

Sulphur (Crude)
(Mine) bulk, long ton..... 18.00—

Talc—
Dom. 100 lb. bags (mine) ton ..... 25.00 to 28.00
Canadian ..... 35.00 to 45.00

Titanium Dioxide—
Barium Pig. bbls., lb..... .19½ to .21½
Calcium Pig. bbls., lb..... .19½ to .21½

Zinc Sulphide, bbls., lb. ..... 11.50 to 11.75

WOOD PULP

Prices, dollars per short, air dry, ton, with inland freight allowed, are:

Bleached sulphite, Swed.....160.00—
Bleached, sulphite, Finish.. —
Bleached sulphite, dom.....128.00 to 135.00
Easy bleaching sulphite.. —
Unbleached kraft, Finn.... —
Unbleached sulphite, Swed..138.00 to 160.00
Unbleached sulphite, Fin... —
Unbleached sulphite, dom..117.00—
Unbleached kraft, Swedish 138.00 to 160.00
Unbleached kraft, northern 110.00 to 120.00
Unbleached kraft, southern..115.00—
Bleached sulphate, Swedish 160.00—
Bleached soda, domestic.. 130.00—
Sulphite screenings, dom. 40.00 to 50.00
Sulphite screenings, dom. 40.00 to 50.00
Groundwood, domestic and Canadian ..... 70.00 to 72.50

PAPER

f.o.b. New York City

Boards—	per ton
Binders	100.00—
Chip	90.00—
Chip, tube and can	95.00—
Chip, full blending	97.50—
Chip, sgl. mla. lined	105.00—
Coated, white patent .016	137.50—
.020 and heavier	137.50—
Kraft liner	105.00—
Filled News	92.50—
Container	105.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

(Per cwt. in ton lots)
Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	16.15—
B Grade E.F.	15.40—
A Grade S. C.	16.65—
B Grade S. C.	16.15—
No. 2 Uncoated Offset 4 sides, White	—
Machine Coated White	
No. 1 Glossy	21.65—
No. 2 Glossy	20.40—
No. 3 Glossy	19.65—
No. 4 Glossy	—
No. 2 Offset	16.90—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—
(In Ton Lots)

	per cwt.
Extra 100% Rag	64.55—
100% Rag	50.65—
75% Rag	43.70—
50% Rag	35.60—
25% Rag	29.75—

Rag Content Ledger—
(In Ton Lots)

	per cwt.
Extra 100% Rag	66.35—
100% Rag	58.20—
75% Rag	44.95—
50% Rag	36.95—
25% Rag	31.00—

Sulphite Bond—

	per cwt.
Air dry, watermarked	—
No. 1 watermarked	18.20—
No. 2 watermarked	17.25—
No. 4 watermarked	16.25—

Sulphite Ledger—

	per cwt.
No. 1 watermarked	20.30—
No. 2 watermarked	20.15—
No. 4 watermarked	19.60—

Glassine (f.o.b. mill)—

	per cwt.
Embossed (25 lb. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof—	
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—

News—

	per ton
Rolls, Standard Contract)	100.00 to 103.00
Rolls (Spot)	(Nominal)
Sheets	110.00—

Tissues (Carlots)—

	per ream
White No. 1—	1.60—
White No. 2	1.45—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	1.50—
Manila	1.65—
Napkins, semi-crepe (12¼ lb. to M shts.) per cs.	.90—
Napkins, full crepe and emb'sed (12¼ lb. to M shts.) per cs.	.90—
Toilet, Bleached (M. shts.) per cs.	7.10—
Toilet, Unbleached (M. shts.) per cs.	5.85—

Towels—

	per case
Bleached	5.25—
Unbleached	4.50—

Wrappings (Kraft)—

	per cwt.
Super-Standard	8.75 to 9.00
No. 1 Wrapping	7.75 to 8.00
Standard Wrapping	7.00 to 7.25
Standard Bag	6.75 to 7.00
Variety Bag	—

Wrappings (Sulphite and Bleached Kraft)—
(Rolls, f.o.b. mill)

Bleached Papers—

	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only)	—
(10,000 lb.)	—
Drug wrapp., 35 lb.	—

Unbleached Papers—

Com. Gr. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch. & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—

Manilas—

Envp. Mla., Sub. 16-40 (No. 1)	—
Envp. Mla., Sub. 16-28 (No. 2)	—
Envp. Mla. (Prices based on large sheets untrim'd ream marked, in bdls.)	—

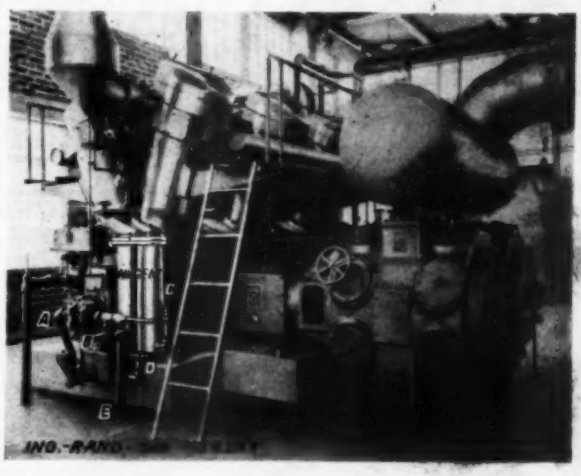
Wrapp Mla. 35 lb. up—

No. 1	9.00—
No. 2	—

M.G. Sulphite and Kraft (other than Waxing)

Grade B20 lb.	—
Grade A-22 lb.	—

Engines . . . Pumps . . . Compressors last longer



when protected by NUGENT Absorbent Type Oil Filters

Longer service life for engines, pumps and compressors is just one of the advantages of protecting this equipment with Nugent Absorbent Type Oil Filters. You save on maintenance, and reduce the amount of costly down-time. Oil costs will go down, too, because Nugent Absorbent Type Oil Filters get 99.8% of the dirt out of the oil enabling you to get more service from your oil.

Nugent Absorbent Type Oil Filters are made in capacities up to 182.5 gpm per container and may be used in multiples. Even the largest size requires only twelve inexpensive replaceable or repackable recharges. Suitable for full flow or by-pass filtering. Does not affect additives in modern compounded oils.

Write for descriptive literature and name of representative nearest you.

NUGENT TRADE MARK Est. 1897

Wm. W. Nugent & Co., Inc.
435 N. Hermitage Ave. CHICAGO 22, ILLINOIS

Oil Filters, Oiling and Filtering Systems, Telescopic Oilers, Oiling Devices, Sight Feed Valves, Flow Indicators . . . Representatives in Principal Cities

THE

BIGGEST

THING IN SAFETY

. . . that's what the Jumbo Posters are. These giant-sized billboard displays measure 11 feet 8 inches wide by 9 feet 11 inches high . . . so BIG they can't be missed!

Many people in your plant aren't aware of some of your most important safety work—essential measures not apparent to the eye. Everybody, on the other hand, can see and understand Jumbo Posters. They are an effective way of reminding your associates—from the president down to the office boy—that safety is a live-and-going concern in your plant.

Jumbo Posters are good public relations, too. Set out in front of your plant, they tell everyone in your community—the residents and the passersby—that yours is a safety-minded company, interested in the welfare of your workers.

Let Jumbo Posters add showmanship to your plant safety and public relations programs. Write today for free illustrated catalog.

NATIONAL SAFETY COUNCIL

425 N. Michigan Ave., CHICAGO 11

The Paper Industry Index to Advertisers

When writing them, please mention The Paper Industry.
Refer to the Paper and Pulp Mill Catalogue and Engineering Handbook at your mill office, for complete listing of all advertisers' products.

Advertising Council, Inc. 694
American Brass Company 684
American Hoist & Derrick Co. 759
Anaconda Copper Mining Company 684
Anheuser-Busch, Inc. 702
Anthracite Equipment Corporation .....
Appleton Machine Company, The .....
Appleton Wire Works, Inc. .....
Appleton Woolen Mills 749
Armstrong Machine Works .....
Arnold, Hoffman & Co., Inc. 722
Asten-Hill Mfg. Co. 703
Atkins and Company, E. C. .....
Aurora Pump Company .....

Bagley & Sewall Co., The 745
Bailey Meter Company .....
Baker & Adamson Products, General Chemical Div., Allied Chemical & Dye Corp. 697
Bauer Bros. Co., The 779
Becco Sales Corporation 687
Beloit Iron Works 679
Bird Machine Company 721
Birmingham Tank Company .....
Black-Clawson Co., The 753
Boston Woven Hose & Rubber Co. .....
Bowser, Incorporated .....
Bowsher Co., The N. P. 779
Buffalo Forge Company 690
Buffalo Pumps, Incorporated .....
Bulkley, Dunton Pulp Co., Inc. .....

Cady and Company, E. J. .....
Cameron Machine Co. .....
Carthage Machine Co. .....
Chain Belt Company 686
Chicago Bridge & Iron Company 680
Clark Equipment Company, Industrial Truck Division 710
Classified Advertising 781
Coes Company, Loring 783
Continental Foundry & Machine Co. 784
Curlator Corporation 699

Dempster Brothers, Inc. 769
DeZurik Shower Company 777
Dicalite Div., Great Lakes Carbon Corp. 785
Dietert Co., Harry W. .....
Dilts Machine Works 753
Downingtown Mfg. Co. 757
Draper Brothers Company .....
du Pont de Nemours & Co., E. I. .....

Eastwood-Nealley Corporation .....
English China Clays Sales Corp. 770

Fawick Airflex Company, Inc. 711
Federal Products Corporation .....
Federated Metals Division, American Smelting and Refining Company 783
Fitchburg Screen Plate Co., Inc. .....
Fleishel Lumber Company 766
Foxboro Company, The .....
Fritz Publications, Inc. 785, 791

Garlock Packing Co., The .....
General Chemical Division, Allied Chemical & Dye Corporation 697
Glidden Company, The 777
Goulds Pumps, Inc. 696
Green Bay Foundry & Machine Works .....

Hanchett Manufacturing Co. 787
Harrington & King Perforating Co. 781
Hercules Powder Company .....
Hills-McCanna Company .....
Hooper & Sons Co., Wm. E. .....
Hubinger Company, The 779
Hudson-Sharp Machine Company 773
Hunt Machine Co., Rodney 772
Huyck & Sons, F. C. .....

Infilco, Incorporated 708
Ingalls Iron Works Company .....
Insul-Mastic Corporation of America 698

Jeffrey Mfg. Co., The 700
Jenkins Bros. 693
Jenssen Company, Inc., G. D. 777
Johnson Corporation, The .....
Jones Foundry Machine Co., W. A. ..... 3rd Cover

Kalamazoo Tank & Silo Co. .....
Kelco Company 761
Koppers Company, Inc. 691
Kuhns Brothers Company, The 775

Langston Co., Samuel M. .....
Layne & Bowler, Inc. 787
Leeds & Northrup Company 695
Lewellen Manufacturing Co. .....
Lindsay Wire Weaving Co., The 785
Link-Belt Company ..... 2nd Cover
Lockport Felt Company .....
Lodding Engineering Corp. .....
Lunkenheimer Co., The ..... 4th Cover

Magnus Metal Corporation .....
Mathieson Chemical Corporation .....
Michigan Steel Casting Co. 781
Midwest Piping & Supply Co., Inc. .....
Minneapolis-Honeywell Regulator Company, (Industrial Division) 705
Mixing Equipment Co., Inc. 783
Modern Engraving & Machine Company .....
Morden Machines Company 688
Morningstar, Nicol, Inc. .....
Mt. Vernon-Woodberry Mills, Inc. 701
Murray Mfg. Co., D. J. .....

Nash Engineering Co., The 775
National Aluminate Corporation 689
National Safety Council, Inc. 790
Naylor Pipe Company 758
Norton Company 704
Nugent & Company, Inc., Wm. W. 789

(Continued on facing page)

Ohio Injector Co., The
Oliver United Filters, Inc.
Owen Bucket Company, The....787

Paisley Products, Inc.
Palmer Filter Equipment Company
Paper & Industrial Appliances, Inc.
Papermakers' & Merchants' Directory of All Nations....772
Perfecting Service Company
Perkins & Son, Inc., B. F....750
Permutit Company, The
Pittsburgh Piping & Equipment Co....765
Poole Foundry & Machine Co....775
Powell Company, The Wm....754
Pusey & Jones Corp., The....714-715

Rice Barton Corporation
Rice Barton Research Corp.
Rogers & Co., Samuel C....781
Rohm & Haas Company, Resinous Products Division
Roots-Connersville Blower Corp....748
Ross Heater & Mfg. Co., Inc.
R-S Products Corporation....767

Sandusky Foundry & Machine Co.
Sandy Hill Iron & Brass Works, The
Shartle Bros. Machine Co....753
Shuler & Benninghofen....792
SKF Industries, Inc....718
Smith & Winchester Mfg. Co.
Smith Corporation, A. O.
Solvay Sales Division, Allied Chemical & Dye Corporation....781
Squier Corporation, The....682
Standard Oil Co. (Indiana)....717
Stein, Hall & Company, Inc....788
Stickle Steam Specialties Co.
Sutherland Refiner Corporation....685
Swenson Evaporator Company....1st Cover

Titanium Pigment Corporation
Torrington Co., Bantam Bearings Division
Turney Halsey Company....701

U. S. Stoneware Company....778
U.S.A.—Treasury Dept.

Valley Iron Works Company....762
Vanderbilt Co., Inc., R. T....706

Waterbury & Sons Co., H....777
Waterbury Felt Co., The....781
Western Precipitation Corp.
Weyerhaeuser Timber Co....681
Whiting Corporation....1st Cover
Whitney Chain Company....746
Williams-Gray Company....779
Wyandotte Chemicals Corporation....692

Yarnall-Waring Company
Youngstown Welding & Engineering Co., The....771

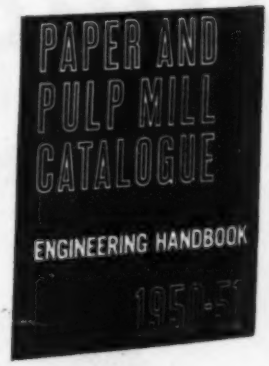
Professional & Business Services Section

Bjorksten Research Laboratories....786
Clark & Company, Wallace
Cohan, W. B....786
Dreshfield, Arthur C....786
Guest & Sons, C. M.
Wierk, Frederick....786

The new 1950-51 edition of the

PAPER AND PULP MILL CATALOGUE Engineering Handbook

is now being distributed to your mill office



The following firms catalogue their products in the 1950-51 edition.

Allington & Curtis Mfg. Co., The
Allis-Chalmers Mfg. Co.
American Cyanamid Co. (Industrial Chemicals Div.)
American Defibrator, Inc.
American Paper Mach'y. & Engr. Wks., Inc.
Appleton Machine Co., The
Armstrong Machine Works
Atkins and Company, E. C.
Aurora Pump Company

Bagley and Sewall Co., The
Bauer Bros. Company, The
Beloit Iron Works
Bird Machine Company
Black-Clawson Co., The
Blaw-Knox Division (Blaw-Knox Co.)
Buckman Laboratories, Inc.
Buffalo Forge Company
Buffalo Pumps, Inc.
Bulkley, Dunton Pulp Co., Inc.

Cameron Machine Company
Carthage Machine Company
Cash Company, A. W.
Chemipulp Process, Inc.
Chicago Bridge & Iron Co.
Cincinnati Grinders, Inc.
Cincinnati Milling Machine Co., The
Continental Foundry & Machine Company
Cowles Company, Inc., The

Dean Brothers Pumps, Inc.
DeLaval Steam Turbine Co.
DeZurik Shower Company
Dilts Machine Works
Dow Chemical Company
Downingtown Mfg. Co.
Dresser Industries, Inc.
Duriron Co., Inc., The

Egan & Company, Frank W.
Electric Steel Foundry
English China Clays Sales Corp.

Falk Corporation, The
Farrel-Birmingham Co., Inc.
Felker Brothers Mfg. Co.
Fitchburg Screen Plate Co., Inc.
Fleishel Lumber Company
Foote Bros. Gear and Machine Corporation
Foster Wheeler Corporation
Foxboro Company, The

Garlock Packing Co., The
General American Transportation Corporation
Gibbs-Brower Company, Inc.
Gilbert and Nash, Division of The Appleton Machine Co.
Glens Falls Machine Works, Inc.
Glidden Company, The
Goslin-Birmingham Manufacturing Co., Inc.
Gwilliam Company, The

Hardinge Company, Inc.
Harris-Seybold Company
Hauser-Stander Tank Co., The
Hendrick Manufacturing Co.
Hermann Manufacturing Co., The
Hewitt Machine Co., J. W.
Hewitt Transmission Co.
Hills-McCanna Company
Hudson-Sharp Machine Co.
Huss Lumber Company
Hyster Company

Improved Paper Machinery Corporation
Infilco Inc.

James Gear Mfg. Co., D. O.
Jeffrey Mfg. Co., The
Johns-Manville
Johnson & Carlson
Johnson Corporation, The
Jones & Sons Co., E. D.
Jones Foundry & Machine Co., W. A.

Kalamazoo Tank & Silo Co.

Ladish Company
Langston Co., Samuel M.
Lawrence Machine & Pump Corporation
Leader Iron Works, Inc.
Link-Belt Company

Maxson Automatic Mach. Company
Merrick Scale Mfg. Co.
Michigan Pipe Company
Midwest-Fulton Machine Co.
Morris Machine Works
Moyno Pump Div., Robbins & Myers, Inc.
Murray Mfg. Co., D. J.

National Aluminate Corp.
Naylor Pipe Company
Newport News Shipbuilding & Dry Dock Co.
Nichols Engineering & Research Corp.
Noble & Wood Machine Co., The
Northern Engineering Works

Ohio Grease Company, The
Oliver United Filters, Inc.

Paper and Industrial Appliances, Inc.
Perfecting Service Company
Perkins & Son, Inc., B. F.
Portland Copper & Tank Works, Inc.
Posey Iron Works, Inc.
Pusey & Jones Corp., The

Record Foundry & Machine Company
Reichhold Chemicals, Inc.
Research Corporation
Rice Barton Corporation
Rice Barton Research Corporation
Robbins & Myers, Inc.
Ronningen Engineering Sales
Roofing Machinery Mfg. Co.
Roots-Connersville Blower Corp.
Ross Engineering Corp., J. O.
R-S Products Corporation

Sandy Hill Iron &, Brass Works, The
Saran Lined Pipe Company
Sarco Company, Inc.
Seybold Division, Harris-Seybold Company
Shartle Bros. Machine Co.
Simpson Co., The Orville
Smith Corporation, A. O.
Spraying Systems Company
Squier Corporation, The
Stebbins Engineering & Manufacturing Co.
Sutherland Refiner Corp.
Swenson Evaporator Co.

Taylor, Stiles & Company
Toledo Scale Company
Trimbey Machine Works
Tube Turns, Inc.

Valley Iron Works Co.

Waldron Corporation, John
Wallace & Tiernan Co., Inc.
Warren Steam Pump Co.
Whiting Corporation
Yarnall-Waring Company

Mention the PAPER AND PULP MILL CATALOGUE *when making inquiries.*

Published by

Fritz Publications, Inc.

59 East Van Buren Street **Chicago 5, Illinois**

Also publishers of THE PAPER INDUSTRY.

Time IS MONEY...

1st Printer: Honestly, Collins, didn't you lose your shirt on that big broadside job you chiseled us out of a couple of months ago?

2nd Printer: We made a tidy profit and we did not chisel.

1st Printer: It takes a lot of time to run out a hundred thousand four-color sheets—and time is money at *our* shop.

2nd Printer: We *saved* time by using the right kind of paper. Color forms registered to a hair—inks dried without offsetting.

1st Printer: That paper must have been terribly high priced.

2nd Printer: It was priced low enough to get the order from some keen competition. The reason why it was low was the same as the reason our bid was low—SPEED.

They use Hamilton Felts at every press of the machine on which this paper is manufactured. These felts remove so much water that the sheet travels over the driers very fast. And time saved is money saved—at a paper mill as well as in a print shop.

From the thinnest tissue to the heaviest board, there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

Jones

Herringbone SPEED REDUCERS

Single, double and triple reduction units cover every requirement in drives from 1 to 400 horsepower. Ratings and standard ratios from 1.25 to 1 to 355.8 to 1 are all shown in Catalog No. 70.

60 YEARS

Since 1890

Jones

In The Service Of Industry

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
PULLEYS • GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • FLEXIBLE COUPLINGS

Listen
TO LUNKENHEIMER QUALITY

Lunkenheimer valves are quiet. The chatter you hear when ordinary iron valves are opened and closed is *the sound of wear* — of the disc dragging back and forth across the seat rings. But listen to a Lunkenheimer iron valve as it opens and closes — smoothly — silently. It doesn't chatter because it's built with *machined* body guide-ribs — an exclusive Lunkenheimer iron-valve feature. Not only are the guide channels in the disc accurately machined, but the ribs in the body as well. Clearance between machined ribs and guides is so accurate that the disc is guided until *final point of closing*. Seating faces are spared the merciless beating they take in other valves. That's one more example of the *thorough* workmanship that makes Lunkenheimer valves last longer. Your Lunkenheimer distributor will supply you. Call him. Check *all* of the reasons for Lunkenheimer's continued leadership in the iron valve field. The Lunkenheimer Co., Box 360S, Cincinnati 14, Ohio.

IRON • STEEL • BRONZE

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-950-10